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Abstracts of the 36th Annual Convention of the AMERICAN SPEECH AND HEARING ASSOCIATION

November 1-5, Los Angeles, California

WEDNESDAY, NOVEMBER 2

W1—DIAGNOSIS OF LANGUAGE DISORDERS.

The Team Approach to Diagnosis of Organic Language Disorders. HEROLD LILLYWHITE and PANEL, *University of Oregon Medical School*—This discussion will concern disorders of communication that extend somewhat beyond the usual concept of a "speech defect." Because of the extensive scope of such communicative disorders, diagnosis cannot be left to one or two specialists. For this reason the diagnostic team has come into being in many instances where major language disorders are presented as clinical problems. The team offers the best method yet devised to bring together enough talent to explore adequately the many facets of a language disorder, and to integrate this information into one complete diagnostic picture. Such diagnostic teams vary considerably from place to place with respect to their membership and methods of operation. Certainly no one group has claimed to have found the best combination and method of procedure. Consideration of one particular group in some detail, however, might aid others by comparison or by contrast. For several years at the University of Oregon Medical School's Crippled Children's Division a diagnostic team has been functioning in the area of language disorders. This team includes nine different medical and nonmedical specialities. The philosophy underlying this particular diagnostic group is based on the premise that quality, rather than quantity, is paramount in this kind of an operation. Therefore, this diagnostic group sees only one patient referred for a language disorder each week. Each individual on the team examines the patient, who is in examination for most of two days. The diagnosis is designed to fulfill three major functions: (1) service to the patient, (2) instruction, and (3) on-going research. The family is extensively interviewd by a medical social consultant, who has previously gathered preliminary information and made the case ready for examination and staffing. During the first day of examination the child is evaluated by a clinical psychologist in order to establish a functioning mental level, and to determine any outstanding psychological problems that may be detected. The child also is examined by a physical therapist and an occupational therapist. These two individuals, rather than being purely technicians, also have become diagnosticians with respect to the establishment of functioning motor levels of upper and lower extremities. The motor quotient of the lower extremities or of the upper extremities has in many cases become as pertinent to the diagnosis as the IQ. Two speech and hearing specialists examine this patient, who usually has been seen on one or more previous occasions in the Speech Department, for preliminary examination. Thorough audiological tests are given, as well as total evaluation of the child's language capacity, his communication deviations, and the establishment of functioning levels of language comprehension, verbal communication, speech intelligibility, and articulation ability. On the second morning of the child's visit to the clinic he is examined thoroughly by an experienced pediatrician, a pediatric-neurologist and an orthopedist, and the family and patient are examined and questioned by a geneticist. At the end of these examinations on the second day, the group comes together to present their findings and discuss the problem. Because instruction is one of the functions of the clinic, a senior medical student sees the patient for initial examination and work-up, and then follows him through all of his examinations for the two days. At the staffing the second day he presents the case of the rest of the staff. Observers of the examinations and staffing include other medical students, nursing students, residents, other medical specialists, public school and agency personnel who are concerned with a patient, and students who are in training in speech pathology and audiology or special education. The family physician, who has been involved in the case from near its beginning by having furnished what information he has, will receive a complete report of the examinations and staffing. School people, and others involved, will receive individual reports of information pertinent to their particular roles. It is significant that no one specialist dominates this team, and that the nonmedical specialists' findings are considered to be as significant as those in medicine. There has developed a free exchange of information and mutual respect. It was slow coming, but the team finally has arrived at a stage of confidence in which it does not feel under compulsion to arrive at a diagnosis and specific recommendations if there is still doubt. Frequently extensive additional examinations are recommended, or time for maturation is suggested. More important, individuals making the referrals have come to accept the fact that answers to such complicated problems are not always readily available, and they are willing to wait until more data is in. The learning situation continues to be of major importance to the team members and others involved, and better diagnosis of language problems is increasingly apparent as the group continues to work together.

Evaluation of Language Disorders: The Team Approach. C. DONALD NELSON, *University of Oregon Medical School*—This paper is based on two years' experience gained through participating with a team of specialists organized for the purpose of evaluating children with language disorders. The material given in the paper discusses reasons for organization of the team, types of children seen and some observations and findings which have resulted from this approach. At the Crippled Children's Division of the University of Oregon Medical School a language disorders clinic has been formed with the intention of examining more thoroughly children who present complicated language disorders. The term "language disorders" will be used here to include the severe reading, writing and spelling problems and associated learning and adjustment difficulties. Once a child has been accepted for this

evaluation, he will be examined by members of the speech department, a psychologist, pediatricians, neurologists, orthopedists, physical and occupational therapists and a geneticist. The family history will be obtained by a medical social consultant. The reason behind this multidiscipline approach is the consideration of every aspect of the child's problem and the obtaining of the most objective appraisal possible. It has been particularly vital to single out organic and neurological deficits since these may be the reasons for the child's complaints. The team approach is a valuable method for the evaluation of complicated language disorders. This is particularly true when the members work together closely, respect the contributions that each can make, and work toward better understanding of these puzzling problems.

W2—RESEARCH IN STUTTERING: PHYSIOLOGICAL FACTORS.

A Study of the Neurophysiological Integrity of the Auditory Feedback System in Stutterers. Hugo H. Gregory, *Southern Illinois University*—The purpose of this study was to explore the overall hypothesis that stutterers have an inherent or acquired difference in the natural auditory feedback system and, consequently, a problem pertaining to the self-monitoring of the speech output. Auditory tests were utilized which, based on experimental studies with animals and clinical evidence in men, appear to contribute to the recognition of physiological impairments at various levels of the neural auditory system. Pure tone alternate loudness balances and simultaneous binaural in-phase and out-of-phase (180 degree difference) median plane localizations were performed at intensity levels of 60 and 90 db at 250 cps, and 30 and 90 db at 1000 and 4000 cps. Eight speech discrimination tests were administered in which the subjects responded to tape recorded phonetically balanced word lists. The following four basic conditions were presented at the equivalent sound pressure level of 60 db: (1) monaural unfiltered speech channeled to each ear, (2) monaural 800 cps cut-off low-pass filtered speech channeled to each ear, (3) monaural 2400 cps cut-off high-pass filtered speech channeled to each ear, and (4) simultaneous binaural presentation of low-pass (800 cps) filtered speech channeled to each ear with high-pass (1400 cps) filtered speech channeled to the opposite ear. The 30 stutterers and 10 nonstutterers were equated on the basis of age, auditory acuity, and intelligence. With reference to the intensity requirements for the alternate binaural loudness balanced and the median plane localization tests, the stutterers and the nonstutterers were closely comparable. Based on these results it was concluded that stutterers do not have a transmission problem involving the auditory pathways or a perceptual deficit similar to neurological extinction or obscuration. On the speech discrimination tests, the stutterers' responses were consistently poorer for each of the eight conditions and showed a significant difference on the simultaneous binaural low-pass-left ear, high-pass-right ear. It was concluded that in terms of the hypothesis of this study a great deal of significance could not be attached to this general trend and the significant difference on only one of the speech tests. However, from a neurophysiological frame of reference, since speech synthesis and integrateion is considered a function of the cerebral cortex it might be speculated that the level of impairment of the auditory system in stutterers, if existent, is cortical. Consequently, suggestions were made for continuing the study of the neurophysiological integrity of the auditory feedback system utilizing filtered speech.

A Preliminary Report of Research on Neurophysiological Functioning of Stuttering and Nonstuttering Adults. J. Keith Graham, David Rutherford, *Northwestern University*, and Joel Brumlik, *Northwestern University Medical School*—The general thesis of this investigation is that there are significant neuro-physiological differences in many stutterers when compared with nonstutterers. Because the possibility of malfunction in this area of behavior is presently receiving renewed theoretical attention, it seemed advisable to initiate a comprehensive research program which would explore such differences systematically, utilizing a team of well-trained medical and speech personnel, recently-developed and validated experimental protocols and modern electronic equipment. This report represents a discussion of the methodology and procedures used to investigate the basic hypothesis and a presentation of research findings to date. As the first stage of the investigation, 26 adult secondary stutterers and 26 matched normal speakers were given complete neurological examinations, standard and activated electroencephalographic, (EEG) testing and exhaustive speech examinations. Additional areas of behavior were also tested, but cannot be discussed in the present report. A distinctive feature of the EEG examination was the utilization of an extended speech performance as an activating procedure and the graphic representation of the subject's speech on the EEG record itself, which permitted visual inspection of the EEG tracings at any given moment of speech, including stuttering blocks. Individual interpretations of the randomized, standard and speech EEG records and the neurological examinations were made by three independent neurophysiologists. The resultant preliminary research findings indicated that in certain stutterers there are definite electroencephalographic and neurophysiological abnormalities. Since the research here being reported represents only the beginning of an extended and comprehensive investigation, it is not prudent to attempt to postulate any causal relationship between the observed neurophysiological differences in these individuals and their stuttering. On the basis of these findings, however, research is continuing with expanded age groups and substantially more exhaustive and definitive testing procedures which will be repeated over an extended period of time. (This is a portion of a long term research project under the joint auspices of the Department of Communicative Disorders and the Department of Neurological Psychiatry and represents the research for the Ph.D. dissertation of Mr. Graham, under the direction of Dr. Rutherford.)

Stuttering and Allergy; Another Look at the Evidence. R. J. Schwartz, *Institute of Logopedics, Wichita, Kansas*—In as much as allergies presumably occur more frequently in stutterers and in the families of stutterers than they do in the general population it has been inferred that allergy and stuttering may be related phenomena. Although usually only a single study is cited, the major evidence for this point of view derives from three investigations. These three studies will be critically reviewed and related to other pertinent literature. Physiologic phenomena associated with the two problems will be compared. A preliminary report of current investigation will be presented. In summary, some skepticism seems warranted concerning the proposition that stuttering and allergy are interrelated. It is also theoretically possible that they are mutually incompatible, or, since co-existence in the same individual cannot be denied, simply disparate entities. Recent information would seem to support this last viewpoint.

The Effect of Compazine as an Adjunct to Speech Therapy with Stutterers. James M. Mullendore, Helen G. Burr, and Harry J. Blanton, *University of Virginia*—Although some previous studies in the area of the use of tranquilizing agents with stutterers have been reported, there are still many unanswered questions. These cover a wide range of needed experimental studies, including such vital factors as the determination of the relative merit of the presently available drugs, individual reaction to various dosage levels of each of the drugs, the optimum time and procedure for administration of chemo-therapy and other considerations. The present ex-

periment was designed to be conducted in two stages, the results of the first phase of which constitutes the present report. The general purpose of the study was to investigate the effects of a tranquilizing agent (Compazine) as an adjunct to speech therapy in the treatment of stuttering. The objective of the first stage was to explore the effectiveness of this compound at standard low dosage in producing changes in the speech pattern of eight adult stutterers when such dosage was used in conjunction with speech therapy. The experimental design involved weekly measurements of block frequency and total reading time. Each subject used a self-rating scale to register his daily judgment of quantity of speaking activity, frequency and severity of blocks, amount of anxiety present in speech situations, and degree of avoidance of speech situations. In addition, clinical estimates were made by each subject's therapist of frequency and severity of blocks, degree of anxiety, and other related factors as observed in each therapy period. For this phase of the study a fixed dosage schedule of 15 milligrams of Compazine per day was taken orally in tablet form. The medication phase of the experiment was preceded by periods of no medication and placebo. Each of these phases were continued for a period of three weeks. Six of the subjects completed the full experiment. In the objective measurements of block frequency and reading time, five of the six subjects showed reduction in these elements during the medication period. Subjectively, all subjects reported improvement while under the medication.

W3—VOICE AND VOICE DISORDERS: CINEMATOGRAPHY OF THE LARYNX.

Function of the Pathological Larynx. PAUL MOORE, and HANS VON LEDEN, *Chicago, Illinois*—The third in a series of motion pictures on the larynx and voice, this film introduces the functional adjustment of the larynx to pathology. It presumes a knowledge of the normal larynx which was described in the two preceding films. The broad area of laryngeal pathology and associated vocal changes is demonstrated through a series of patients with different laryngeal diseases. In each case the clinical appearance of the larynx and the related voice are presented synchronously for identification. These clinical manifestations are followed by brief examples of the underlying, basic physiology in ultra slow motion pictures photographed at speeds up to 5,000 frames per second. This cinematographic approach provides new and detailed information on vocal cord vibration and arytenoid motion in the pathologic larynx. Diagnostic or prognostic clues are offered in such different conditions as laryngeal edema, inflammations, and neoplasms. The pictorial evidence includes information of value in planning indicated therapy. Color and ultra slow motion black and white 16 mm. film, running time 23 minutes.

High Speed Cinematography of the Larynx. HENRY J. RUBIN, *Beverly Hills, California*—This high-speed motion picture (4000-8000 frames per second) depicts function of the larynx in the normal and numerous pathologic states. Included is laryngeal behavior in situations not previously demonstrated by this type of photography, such as coordinated registration, the falsetto "break," cerebral palsy, Parkinson's disease, hysterical dysphonia, and the child. The action of the cricopharyngeus in esophageal speech is also shown. 32 mm., black and white and color, silent, showing time 35 minutes.

Aphonia Relief in Adductor Paralysis with Bone Paste Injections. JOHN M. PALMER, *University of Washington,* and WILLARD GOFF, *Seattle, Washington*—Although not common, unilateral vocal fold adductor paralysis is a severely handicapping phonatory problem, usually leading to aphonia and resulting in communication and personal problems. Observations have indicated that when such patients also suffer upper respiratory inflammations they can phonate as a result of edematous vocal folds. This study is an attempt to determine if an artifically "swollen" vocal fold can be effective in phonation, and if it could have some degree of permanency. Recently, the development of calf bone paste of such fine granulation as to pass with some ease through injection equipment has facilitated the treatment of these patients. Three such patients were treated in the past year: varying etiologies exist in respect to the paralyses. One patient has expired (from an unrelated cause), giving an opportunity for post mortem cytologic studies of the injected folds. Results indicate that phonation can be returned (although not of a "normal" quality), that the injection is not harmful, and that the tissue changes resulting allowing for approximation of the two folds, are of some permanence.

W4—SPECIALIZED AUDIOMETRIC PROCEDURES.

Intensity Generalization in Clinical Galvanic Skin Response Audiometry. MARILYN H. GIOLAS, *Cleveland Hearing and Speech Center*—Most of the studies which mention the matter of the intensity level of the conditioning tone to be used in galvanic skin response audiometry advocate establishing conditioning with tones of high intensity relative to predicted threshold in order to insure audibility. In view of what is known concerning the intensity generalization gradient and stimulus intensity dynamism, however, it was hypothesized that conditioning established at an intensity close to the intensity of the extinction or test tone will result in greater resistance to extinction than will conditioning established at relatively high intensities. Two groups of normally hearing adults, of fifteen persons each, were used. One group was conditioned at 60 db HL and the other group at 20 db HL. All subjects were given extinction trials at 10 db HL. The GSR amplifier employed in this study was so designed that amplitude of response could be used as a meaningful measure. The following conclusions were suggested: (1) Conditioning which is established at an intensity closer to the test tone results in greater resistance to extinction. This is true whether amplitude or number of responses is used as the measure of strength of conditioning. (2) The stimulus intensity dynamism as well as the generalization gradient are operating when conditioning is performed at intensities considerably higher than that of the test tone, tending to decrease the magnitude of the response at the test intensity. (3) In clinical GSR audiometry every effort should be made to condition as close to the suspected or confessed threshold as possible. (This research was done as a student at the University of Pittsburgh under the direction of Aubrey Epstein.)

GSR Measurement of Auditory Discrimination: A Preliminary Report. KATHRYN B. HORTON and FORREST M. HULL, *Bill Wilkerson Hearing and Speech Center,* and AMY KEY, *Arkansas Children's Hearing and Speech Center, Little Rock*—The present study is concerned with the measurement of auditory discriminative ability at supra threshold levels utilizing the electrodermal response conditioned to three groups of auditory stimuli, hypothesized to represent a range of complexity with reference to the perceptual-discriminative function. The experimentation is concerned with three type-groups of subjects: (1) a group of normal hearing adults with demonstrable intact auditory discrimination abilities; (2) a group of normal hearing children, ranging in age from 18 months to 6 years, who show no language or other developmental pathology; and (3) a clinical population of children showing significant delay in language and speech acquisition. This paper reports the instrumentation, development of the

methodology, and the results of the first phase of experimental investigation, i.e., the data gained from auditorially normal adults which comprises the validation of the technique.

The Reliability of Conditioned GSR Audiometry with Adult Males. JOSEPH B. CHAIKLIN, IRA M. VENTRY, and LYMAN S. BARRETT, *Veterans Administration Hospital, San Francisco, California*—Recent research by Doerfler McClure, and Burk has established the validity of conditioned GSR audiometry in adults. The reliability of conditioned GSR audiometry, however, has not been investigated systematically. The primary purpose of this study was to investigate the test-retest reliability of pure-tone thresholds measured by conditioned GSR audiometry. There were 40 subjects: 20 hard-of-hearing adult males with surgically demonstrated otosclerosis and 20 adult males with normal hearing at 500 cps, 1000 cps and 2000 cps in the ear tested. Each subject was tested twice at 1000 cps by conditioned GSR audiometry and by standard pure-tone audiometry. The same ear was tested each time and the second test came approximately one month after the first test. The basic test instruments were a Grason-Stadler psychogalvanometer (Model E 664) and an Allison 21 CG audiometer. Conditioning and sampling schedules were employed, and a different tester administered the retest for each subject. GSR sampling occurred at voluntary pre-tone threshold and at levels −10, −5, 0, +5, +10 db *re* voluntary threshold. Control events, consisting of stimulated conditioned stimulus presentations, were dispersed throughout the sampling schedule. Independent analyses of the GSR sampling records were performed with latency and magnitude as the basic response criteria. The number of acceptable GSRs required for threshold determination was set as a function of the number of responses obtained on control presentations. Preliminary analysis of results indicates that subjects who meet a conditioning criterion on both tests have test-retest GSR thresholds within ±5 db of each other.

A Study of PGSR Testing of Rh Athetoids. IRWIN LEHRHOFF, *Beverly Hills, California*—A group of thirty athetoids with known hearing impairment and an etiology of erythroblastosis were tested by PGSR, Pure Tone, and Speech Audiometry. All thirty had bilateral hearing losses and all had a perceptive or mixed diagnosis for each ear. Galvanic skin responses could not be obtained on eight of this group so that PGSR-Pure Tone comparisons were only determined for the remaining twenty-two. Only the four frequencies of 512, 1024, 2048, and 4096 cycles per second were tested. Hearing loss was positively related to frequency, ranging in the right ear from a low 23.21 db of loss at 512 cycles per second to a high of 56.41 db of loss at 4096 cycles per second for the pure tone air conduction data. In the left ear, a similar relationship was seen, with a low of 18.41 db at 512 cycles to a high loss of 42.29 db at 4096. The left ear data was 5 to 10 db below the right. PGSR results showed .95 db to 14 db better acuity than pure tone data along the testing range. Spondee word test measures showed a mean threshold for the right ear of 38.63 decibels and 30.33 decibels for the left ear. Findings are discussed and interpreted. Results confirmed the hypothesis that erythroblastosis may damage portions of the inner ear or eight nerve system in its gross destruction of the basal ganglia area which creates the athetosis.

A Comparison of Normal Hearing Thresholds of Male Children with Those of Young Adults by Automatic Audiometry. KENNETH G. STOCKWELL, *Vanderbilt University*—The present study was designed to investigate the hearing acuity of male children 11-13 years of age to determine whether their hearing is hyperacute or is similar to the reference norms established on a group of young adults. In addition, the data were analyzed to permit a comparison of two methods of testing and to compare the hearing level of the right ear for both groups of subjects with that of the left. Each subject in both groups was determined to have hearing within normal limits and no recent history of ear trouble. All the tests were administered in an anechoic chamber. A Grason-Stadler Model E-800 audiometer was used for continuous tone audiometry, while the Beltone 15-A audiometer was used for discrete frequency testing. The data obtained were subjected to statistical analysis which resulted in the following findings: (1) Of the fourteen statistical comparisons of mean thresholds for children and adults only three resulted in statistically significant values. Children exceeded adults at 8000 cps in both ears by amounts which were significant at the 1% level. (2) Three of four mean differences in thresholds for the two groups by discrete audiometry were statistically significant at the 5% level or more in favor of adults. (3) When the results by the two methods of audiometry were compared, all differences were statistically significant at the 1% level in favor of automatic audiometry. (4) Sixteen of the eighteen differences comparing right ear versus left ear were statistically nonsignificant. From the results obtained one cannot conjecture that the hearing of children is significantly better than that of young adults, except possibly for the highest tones. The markedly superior ability at 8000 cps shown by the children in the present study, together with a general trend for better hearing above 1000 cps, suggests the possibility that human hearing is at its most sensitive peak by the second decade of life, and that a slight deterioration for the highest tones may set in by the third decade of life. For both groups automatic audiometry produced markedly better thresholds, indicating the need for further study in comparing the two methods. Finally, when a direct comparison of the right and left ears was made, significant results were obtained only at two frequencies, one for children and one for adults. The lack of any pattern here suggested difference between ears did not exist for the subjects used.

W5—EXPERIMENTAL PHONETICS III: COMPUTER METHODS FOR SPEECH ANALYSIS.

Automatic Processing of Bio-Acoustic Data. SANFORD E. GERBER and WILLIAM A. STEWART, *System Development Corporation, Santa Monica, California*—The paper has as its main purpose the evaluation of the possibilities of employing machine techniques to the purpose of processing various types of bio-acoustic data. The paper begins with a brief description of the field of automatic data processing as it exists today, with emphasis placed on those types of equipment and those techniques which are especially suited to the problems of data handling encountered in the bio-acoustic laboratory. In Part II, the various types of data made use of in bio-acoustic work are analyzed in terms of their relationship to those types of equipment previously discussed, such as analog and digital devices, and problems of adaptation are briefly considered. Part III points out the various practical and theoretical uses for bio-acoustic data processing, such as industrial and military applications, as well as laboratory research and aural rehabilitation.

Automatic Reduction of Speech Signals by a Digital Computer: Application of Principles of Analysis-by-Synthesis. A. S. HOUSE, C. G. BELL, H. FUJISAKI, J. M. HEINZ and K. N. STEVENS, *Massachusetts Institute of Technology*—The automatic recognition of speech signals requires several stages of data reduction. In an early stage of analysis the speech wave must be reduced to a set of low information-rate signals that specify such parameters as the time-varying vocal-tract resonances and source characteristics. This paper describes a

procedure for performing the analysis at this stage, although some of the principles may be applicable to higher levels of analysis. The method involves the comparison of speech spectra with a series of spectra that are synthesized within the analyzer. All these operations are programmed on a general-purpose digital computer. The method of assembling the internally-generated spectra is based on the acoustic theory of speech production. The analysis technique has been applied to the reduction of spectra of vowels and some consonants, and has shown that the accuracy obtainable is considerably greater than has been possible with methods reported heretofore. (This work was supported in part by the U. S. Army (Signal Corps), the U. S. Air Force (Office of Scientific Research, Air Research and Development Command), and the U. S. Navy (Office of Naval Research); and in part by the Air Force Cambridge Research Center under Contract No. AF 19 (604)-6102.)

Formant Frequencies of Vowels Measured by a Digital Computer Program. A. S. HOUSE, H. FUJISAKI, K. N. STEVENS, *Massachusetts Institute of Technology*—A computer method is utilized to measure the formant frequencies of the common vowels of American English. The method of analysis represents an application of the principle of analysis-by-synthesis as described in an earlier paper. The speech for analysis consists of nonsense materials recorded by three adult males. The materials are designed to provide samples of stressed vowels preceded and followed by a variety of consonants; the vowels in question occur in consonant-vowel-consonant syllables in which both consonants represent the same phoneme. The center frequencies of the formants are measured for spectral samples occurring at various times during the course of the vowels. The effects on formant frequencies attributable to temporal location of sample, consonant environment, and individual talkers are discussed. Data on the bandwidth of vowel formants are presented and compared to measurements obtained through other means of analysis. (This work was supported in part by the U. S. Army Signal Corps), the U. S. Air Force (Office of Scientific Research, Air Research and Development Command), and the U. S. Navy (Office of Naval Research); and in part by the Air Force Cambridge Research Center under Contract No. AF 19 (604-6102.)

W6—REHABILITATIVE ELECTROACOUSTIC AMPLIFICATION.

A New Method For Determining "Gain Requirements" of Hearing Aids for Subjects With Recruiting Sensorineural Hearing Losses. DONALD M. MARKLE, *New York University Bellevue Center*, and ANNETTE R. ZANER, *Bird S. Color Hospital, New York*—In determining the amount of acoustic gain required of a hearing aid for a given patient, usual clinical procedure has been to provide an instrument which is capable of producing gain which approximates the degree of hearing loss for speech. Apparent thinking has been "to provide enough gain to over-ride the hearing loss." Since a hearing aid does not have any effect on auditory threshold but, rather, on the auditory stimulus, it does not necessarily hold that one offsets the other. Conventional procedures appear to be adequate for those patients who are fortunate enough to enjoy a normal rate of loudness increment but it may be assumed that, for those with recruiting perceptive deafness, and for those with conductive deafness which is accompanied by abnormally rapid loudness increment, the usual method for determining gain requirements of a hearing aid may result in over-amplification. A series of subjects with bilateral perceptive deafness were "fitted" with a special precalibrated hearing aid which was adjusted so that its average gain for 500, 1000 and 2000 cps was equal to the subject's hearing loss for speech. Speech reception thresholds were obtained, social adequacy indices were determined (average discrimination scores for faint, average and loud speech) and thresholds of discomfort were reported. Testing was repeated after the hearing aid had been reset to provide gain which was equal to *the difference between the intensity of average speech and the subject's "most comfortable loudness level."* The latter condition provided poorer speech reception thresholds but better social adequacy indices and higher thresholds of discomfort. The results of this investigation indicate that many people with losses between 40 and 60 db may obtain increased benefit from a hearing aid that provides as little as 5 to 20 db gain.

Stereophonic Recordings for Improving Auditory Perception: A Demonstration Report. MOE BERGMAN, *Hunter College*—Stereophonic recordings on magnetic tape have been prepared by the Industrial Home for the Blind in an experimental program for training the auditory perceptual abilities of blind persons with impaired hearing. It appears that the training resulting from the use of these recordings is applicable as well to blind persons with normal hearing and to the sighted hard-of-hearing population. This presentation will feature a demonstration of the recordings and a sample lesson, involving the audience, to illustrate the development of skills in the perception and identification of everyday noises and in the localization of stationary and moving sound sources. In the recordings sounds of daily living, which are suggested as part of a "Basic Sounds Vocabulary" for auditory perception, are presented in isolation and in familiar sequences. It is suggested that, in addition to serving as a tool in auditory training these recordings, or others similarly prepared, may provide new insights into the psychology of perception and provide a better understanding of the perceptual relationships between the individual and his environment.

Monaural and Binaural Discrimination for Speech. RAYMOND CARHART, *Northwestern University*—A competing message test, consisting of PB-50 words presented at an easy listening level through one loudspeaker while FTL Intelligibility items are reproduced simultaneously through a second loudspeaker, has been developed. This test was administered in a standardized sound field under 15 different conditions to normal hearers. Five presentations were made while each subject was listening binaurally. One ear was plugged during the remaining ten presentations, five of which were monaural ipsilateral (PB items coming from the side of the open ear) and five of which were monaural contralateral (PB items coming from the side of the plugged ear). Three important findings emerged. First, discrimination in the absence of the competing message was very good for all three listening conditions. Second, the competing message could be adjusted to interfere as much as one wished with discrimination for the primary message (i.e., the PB words). Third, binaural efficiency was greater than monaural efficiency but this was true only under some spatial arrangements of the acoustic environment. Specifically, performance during the contralateral monaural condition was consistently inferior to that under the other two conditions, for which discrimination was generally equivalent. These findings have two implications for hearing aid evaluation. First, the competing message test is promising as a clinical tool because it presents a listening task which is difficult enough to explore the relative efficiencies of aided monaural and aided binaural performance. Second, only the contralateral presentation should be employed when testing with monaural hearing aids, since the question to be answered is whether binaural instruments exhibit superiority under conditions where they should so so. Finally, the practical implication is that every user of a monaural instrument should receive training in how to take advantage in everyday life of the fact that monaural reception is as affective as binaural reception under many circumstances.

W7—RESEARCH IN STUTTERING: BEHAVIOR STUDIES.

Maternal Insight into the Adolescent Stutterer's Attitude Toward His Stuttering. KATHERINE BUTLER, *Western Michigan University, Kalamazoo, Mich.*—The purpose of the study was to investigate the extent of parental (maternal) understanding of her son or daughter's attitude toward his stuttering. The Miller Test of Attitude Toward Stuttering (Part I) was administered to 50 adolescent stutterers and their parents. The parents were asked to reply as to how, NOT they, but their children felt about their speech. Statistical analysis revealed that mothers of stuttering sons showed more nonacceptance of stuttering than did their sons in 74% of the statements; whereas mothers of stuttering daughters showed more nonacceptance of stuttering than their daughters in only 27% of the statements. (Additional pertinent %iles and t scores for significances of differences between responses would be presented in written form.) The test as a whole indicated a marked discrepancy in differential in responses scored. This discrepancy was greater for mother-son comparison than for mother-daughter comparison. Cultural differential in the evaluation of stuttering is demonstrated. Mothers of male stutterers showed a marked degree of greater nonacceptance than did those of female stutterers, and this may be construed as indirect evidence in support of Johnson's diagnosogenic statements. The sex ratio of male and female stutterers may be clarified in the light of such ratios of nonacceptance by the maternal figure.

A Follow-up Study of Teenage Stutterers. ESTHER HOROWITZ, *Hofstra College, New York*—A follow-up study was performed of young stutterers who had been in attendance at a college-oriented speech clinic at least four years previously. Fifteen of the 135 people who were contacted appeared for the follow-up interview. The 12 boys and 3 girls had an average of 18.2 at the time of the follow-up. All but one girl still stuttered in some situations. This one person had originally been diagnosed as a lisper and incipient stutterer, but was completely unaware of the fact that the stuttering diagnosis had ever been made. Four exhibited a mild stutter, seven had moderate symptoms, two were diagnosed as severe stutterers. One of the girls, a resident of a mental hospital, was suffering from voluntary mutism. The subjects were not uniformly enthusiastic about the effectiveness of the speech clinic, although eleven of them said that if they had a child who stuttered, they would take him to a speech clinic. Responses to the question of what advice they would give to other stutterers included such homilies as: don't think about it, take your time, take a deep breath, etc. In addition to raising the question of the accomplishment of the speech clinic in helping the stutterer the present study illustrates the extremely difficult and expensive nature of the follow-up technique.

Effects of Stuttering on Audience Listening Comprehension. HERBERT N. KLINGER, *Hunter College, New York*—The purposes of this study were to determine: (1) whether stuttering interferes with audience listening comprehension, (2) whether different severities of stuttering affect audience listening comprehension, and (3) whether prior knowledge concerning the stutterer's speech has any effect on audience listening comprehension. Two groupings of ninety-six subjects were used in this study. Each group was divided into three parts, which were referred to as Groups A, B, and C. Each of these groups was divided into two subgroups. The passages of Form 1A of the Sequential Tests of Educational Progress Listening Test were prerecorded by a normal speaker and was administered to members of Groups A, B, and C. Two days after each of the groups received this test, they were given Form 1B (an equated form). The passages in this test were prerecorded by a person who was diagnosed as a stutterer. This speaker recorded the test passages three times. In one recording the speaker spoke in what was considered to be normal speech. In the second recording he spoke at one level of severity of stuttering. In the third recording he spoke at a level of stuttering which was considered to be more severe than in the second recording. Certain information was given to some of the subgroups prior to the administration of the second listening test. Subgroups A_1, B_1, C_1, were told nothing concerning the speech of the second speaker. Subgroups A_2, B_2, C_2 were informed, in writing, that the second speaker was undergoing speech therapy and had developed a healthy mental attitude toward his stuttering. Group A heard the stutterer use normal speech, Group B heard him use the milder form of stuttering, while Group C heard him use the more severe form of stuttering. Analysis of variance revealed no significant differences among the groups of either administration. Similarly, no differences were found to exist among the subgroups. The results led to the conclusions that, with respect to the levels of stuttering employed in this study, (1) stuttering does not interfere with audience listening comprehension, (2) different severities of stuttering have no effect on audience listening comprehension, and (3) prior knowledge concerning the stutterer's speech has no effect on audience listening comprehension. (This study was performed under the direction of Professor Dorothy Mulgrave.)

Effect of an Audience on Serial Association. ROBERT GILLEN, *Los Angeles State College*—The aim of this study was twofold: (1) to construct a means of determining to what extent an audience influences a speaker's word selection and (2) to serve as an exploratory probe into the relationship between speech and personality. The general hypothesis upon which the study was based was that social pressure, defined as a sentient and attending audience, alters the quantity and quality of an individual's vocabulary selection in the utterance of discrete, serially associated words. Forty speakers, twenty male and twenty female, were instructed to say aloud as many discrete words as possible in five minutes. They could not, however, use any form of grammatical construction, count, repeat, rhyme, or use foreign words. Two experimental conditions were arranged: (1 the Isolation condition, in which each subject verbalized aloud while seated alone in a sound-treated room and (2) the Audience condition, which was similar to the Isolation condition except that the subject verbalized in the presence of a small audience. Without the subjects' knowledge all utterances were tape recorded by means of a concealed microphone. The tapes were transcribed later and the results submitted to tests of significance appropriate to twelve subquestions dealing with both qualitative and quantitative aspects of serial association. The central hypothesis appears to have been supported in a number of ways. Social pressure seems to affect word totals, vocalized pauses, and the use of intimate words. There also appear to be forces at work which influence the number and duration of serially associated word trains. In addition, the serially associated word trains at times show highly interesting sequences of ideas. The results show few sex differences with respect to the parameters tested. Implications from this study hold potential promise for the fields of stuttering, psychodiagnosis and therapy, personality dynamics and testing, and discussion. The results may also be interesting to the fields of of law and advertising. (This work was done at USC as partial fulfillment of the requirements for the doctorate degree.)

W8—CONTRIBUTED PAPERS IN AUDIOLOGY.

The Function of Tactile Feedback Under Conditions of Delayed Auditory Feedback. FORREST M. HULL and MARTHA JOE WILSON, *Bill Wilkerson Hearing and Speech Center,*

Nashville, Tennessee—The function of tactile feedback cues in speech production was investigated by comparing speech output under "normal" (usual) conditions and under conditions of tactile anesthesia involving selected speech articulators. Adult male speakers read aloud under different conditions as follows: (1) read a standard test passage under normal conditions, (2) read the passage under delayed auditory feedback conditions, (3) read a different passage for a period of ten minutes with delayed auditory feedback, and (4) reread the test passage with delay. The same procedure was repeated after the subject had received a bilateral mandibular block which destroyed the tactile sense in the anterior two-thirds of the tongue, lower teeth, lower alveolar ridge, and lower lip. The mandibular block did not disturb motor innervation. During the anesthetized state, without delay, the speech production was significantly disturbed as compared to the same condition without anesthesia. While reading with delayed auditory feedback and anesthesia, the speech disturbance was significantly increased over the same condition without anesthesia. These two findings indicate that, under "normal" conditions (without anesthesia) of delayed auditory feedback, tactile cues are functioning during normal speech production and appear to compensate for the disturbed auditory feedback channel to a degree. When the tactile feedback cues are disturbed, additional control producing information is lost to the speech producing mechanism. After reading the practice material for ten minutes with delay, there was a significant reduction of speech disturbance as compared to the "prepractice" period in both the preanesthetized and the anesthetized conditions. Adaptation during the anesthetized state suggests the possibility that other feedback channels may assume a compensatory function although the effectiveness is increasingly reduced as additional feedback cues are disturbed or removed from the system.

Control of Tinnitus in Diagnostic Audiology. PHILIP E. ROSENBERG, D. S. HATTON, D. PHIL, and S. D. ERULKAN, *Temple University School of Medicine and Hospital, Philadelphia, Pennsylvania*—In the testing of labyrinthine function in the Vertigo Clinic of Temple University Hospital, one of the tests routinely administered was the test utilizing galvanic stimulation of the labyrinth. It was noted that many patients so tested reported marked change in the intensity and quality of their tinnitus aurium. It was decided to investigate this particular phenomenon as completely as possible. Each patient had a complete Ear, Nose and Throat examination as well as a detailed audiometric survey and gross neurological and static labyrinth investigation. Tinnitus was matched as to frequency, quality, and intensity. A galvanic current was applied across the skull by several different methods. The effect upon tinnitus intensity was noted according to the polarity of the current. In many patients if the anode were placed on the zygomatic arch on the side of the tinnitus, the tinnitus intensity would decrease as the current increased; conversely, with the cathode on the affected side, an increase in the current strength would produce an increase in the tinnitus intensity. In several of these patients it was possible to abolish the tinnitus entirely during administration of the test. Usually, as the test stimulus was reduced, the tinnitus returned. However, in three cases the tinnitus remained absent even after the test stimulus was withdrawn. From an analysis of the audiologic data, it appears that tinnitus is affected most often when the lesion can be demonstrated to be in the cochlea itself. In those cases where retrocochlear pathology was suspected the investigators were unable to evoke any change in tinnitus intensity through application of galvanic current. Although no therapeutic claim is made for this test it is felt that the galvanic current can yield valuable information concerning localization of the lesion in the auditory mechanism. Furthermore, the test provides us with a useful tool for the study of a condition for which experimental animals cannot be used.

An Investigation of Certain Psychophysical Parameters of Tinnitus. JAMES T. GRAHAM, *Stanford University*—The purpose of this study was to evaluate the use of audiometric techniques in the study of tinnitus aurium. Three parameters were chosen for investigation. These were pitch, loudness, and the susceptibility to masking. Three groups of hard-of-hearing subjects were used for these evaluations. Subjects were classified on the basis of audiometric test results as having a conductive, mixed, or perceptive type loss. A fourth group, composed of normally hearing individuals, was used to assess the occurrence of tinnitus in the absence of hearing loss and to serve as a control group. The total N is 128, divided equally among the four groups. Analysis of the results of the study are focused on the presence of significant differences between diagnostic and etiologic classification for the parameters investigated. Comparisons are made between the subject's descriptions of his symptom and the measurements that are obtained of it. It is hoped that two questions can be answered on the basis of the results of this study: (1) Can audiometric tests provide information about tinnitus aurium that is diagnostically significant? (2) Is there any systematic relationship between a patient's description of his tinnitus and measurements of it? (Based on part of a Ph.D. disseration done under the direction of Dr. Hayes A. Newby, Stanford.

Testing Binaural Auditory Discrimination in Noise Using a Multiple Speaker System. EDWARD W. GIBBONS and BETTYE W. SMITH, *V.A. Outpatient Clinic, Los Angeles*—The purpose of this study was to investigate the most effective method of testing auditory discrimination using various combinations of speakers in a multiple speaker system. Testing of auditory discrimination is usually obtained by introducing both speech and noise stimuli through one speaker, or speech through one and noise through a second speaker. Standard masking is usually complex or white noise, both of which are limited for testing discrimination ability in noise. The most difficult listening situation encountered in general communication, especially for the hard of hearing, is listening to speech in a background of cocktail party noise. In order to discover more information regarding discrimination ability in such a background of babble, an experiment was designed employing four different methods of presentation of combined speech and a cocktail party type of noise, previously studied, over a multiple speaker system. The population consisted of 30 normally hearing subjects. The four experimental conditions which employed listening in the horizontal plane, were as follows: (1) A phonetically balanced word list and noise through the same frontal speaker; (2) A phonetically balanced word list through one speaker and the noise through a second speaker, each placed equidistantly at a 45 degree angle to the left and right of the subject; (3) A phonetically balanced word list through the frontal speaker with noise through both a left and a right speaker placed equidistantly at 90 degrees from the subject; (4) A phonetically balanced word list through the frontal speaker with noise in left, right and back with speakers placed equidistantly at 90 degrees from the subject. The results and clinical implications are discussed.

W9—SPEECH AND HEARING OF FOREIGN STUDENTS I.

An Experimental Investigation of the Intelligibility of Japanese-Born, American-Speaking, Male College Students. HAL JAMES BARGELT, *Los Angeles City College*—The problem investigated in this study was: Do characteristically Japanese vowel, consonant, and nonarticulatory speech errors equally

affect the intelligibility of acquired American speech of Japanese-born male students? More specifically, the questions were: (1) Do the four types of vowel errors (substitution, omission, addition, and distortion) equally affect intelligibility? (2) Do the four types of consonant errors (substitution, ommision, addition, and distortion) equally affect intelligibility? (2) Do the five types of nonarticulatory errors (faulty syllable stress, failure to obscure unstressed vowels or syllables, exaggeration, faulty pauses and rhythm, faulty pitch fluctuation) equally affect intelligibility? (4) Do characteristically Japanese vowel, consonant, and nonarticulatory errors when spoken by an Oriental voice and by an Occidental voice equally affect intelligibility? An assessment of the relative importance of vowel, consonant, and nonarticulatory errors upon the intelligibility of the American speech of Japanese-born male students was made by analyzing the mistakes of auditors who wrote what they heard when listening to a tape recording of sentences containing characteristically Japanese speech errors. It was concluded that: (1) Characteristically Japanese vowel, consonant, and nonarticulatory speech errors do not equally affect the intelligibility of acquired American speech of Japanese-born male students. Vowel errors reduce intelligibility more than consonant errors, and both reduce intelligibility more than nonarticulatory errors. (2) Vowel errors of omission appear to reduce intelligibility more than vowel errors of substitution, addition, or distortion. (3) Consonant errors of omission reduce intelligibility more than consonant errors of substitution, addition, or distortion. (4) Nonarticulatory errors that affect several consecutive words in a sentence tend to reduce intelligibility more than nonarticulatory errors which affect only a single word. (5) Sentences spoken by an Occidental are more intelligible to an Occidental audience than are the same sentences spoken with identical Japanese errors by an Oriental. (This study was one under the direction of William Perkins and Victor P. Garwood, USC)

Reproduction and Recognition of English Speech Sounds as Affected by the Native Languages of International Students. GERTRUDE MAE BERNSTEIN, *Ohio Department of Health*—This study sought to answer two experimental questions. Is the correct reproduction of English speech sounds by nonnative speakers of English a function of their languages? Is the recognition of English speech sounds by nonnative speakers of English a function of their own languages? Two tape recorded tests composed of nonsense monosyllables were administered individually to 32 students from The Ohio State University. There were eight students from each of four language groups, American, Arabic, Japanese and Spanish-American. The oral responses to one test in which the speaker repeated the syllables that he heard were recorded and played back to a listening panel of five graduate students of the Speech Department of The Ohio State University for phonetic transcription. In a second test the experimental subjects identified the sounds of the syllables by designating symbols from a multiple choice form. The data were treated by analysis of variance. The results indicated that the ability to recognize and to reproduce English speech sounds by a nonnative speaker of English was influenced by his own language: the English sounds that are most difficult for nonnative speakers of English are the sounds not in their native languages. Nonnative English speakers with the same native language background tended to make the same substitutions and confusions during the recognition and reproduction of English sounds and to substitute regularly a particular sound of their language for a specific English sound.

Apparent Factors Leading to Errors in Audition Made by Foreign Students. ALAN C. NICHOLS, *University of California, Santa Barbara*—A study of errors in the reproduction of sentences made by foreign students (Nichols 1958) culminated in the tentative classification of departures from word-for-word order as follows: (1) Omissions, (2) Substitutions, (3) Additions, (4) Transpositions. The present study deals with the effects of certain variables in sentence structure upon the frequency of each type of error. The variables studied were (1) the length of the sentence in words, (2) the familiarity—as defined in terms of frequency-of-use in the Black-Ausherman vocabulary—of the words in the sentence, (3) "naturalness" of sentence structure—determined by ranking a list of sentences, and isolating words of "high" and "low naturalness." Sentences were written and selected to represent lengths of from seven to nineteen words, three levels of familiarity, and "high" and "low naturalness." The sentences were recorded and presented to groups of twenty-five foreign students by means of earphones. The results show that all three variables are apparently factors in the errors of audition made by foreign listeners. Errors increase as sentence length is increased, as familiarity of the words in the sentence decreases, and as the "naturalness" of the sentences decreases. In terms of error type the proportion of omissions increases as the number of errors increases; that is, decreases in proportion to the increase in omissions as a general rule. The proportion of additions and transpositions was not large in any sentence group. In general, additions and transpositions appear in sentences which are longer, less familiar and less "natural," but tend to disappear in the longest, least familiar and least "natural" of the sentence groups.

The Relative Intelligibility of Language Groups. G. C. TOLHURST, *United States Naval School of Aviation Medicine* and J. W. BLACK, *Ohio State University*—Considerations of the relative intelligibility of dialects among speakers of English led to a comparison of the speaking and listening test scores of native American, British, and French individuals employing English language tests. Both nationality dialect groups assigned statistically similar speaker intelligibility scores that ranked from least intelligible in order of French, English, and English-English. A second hypothesis was explored by obtaining basic reception scores from groups of American listeners and then indoctrinating them with an hour's sample of each "foreign" dialect and finally retesting with an equivalent test. Scores were significantly improved.

W10—PROBLEMS ASSOCIATED WITH OROFACIAL MUSCLE PRESSURE IMBALANCE.

The Mechanism of Normal Swallowing. SIR VICTOR NEGUS, *London, England* (Tape Recording).

Dental and Speech Problems Associated with Orofacial Musculature Imbalance as Delineated by British Scientists Since 1946. HENRY JANN, *Rochester, N. Y.*, and GLADYS REID, *Cooperative Services, Rochester, N. Y.*—During the past fifteen years a tremendous revolution in research and thinking in so far as pedodontia and speech pathology has occurred in the consideration of oromuscular behavior as it effects the position of the teeth and development of articulation. This work has primarily been English. The contributions of the outstanding scientists as the Dental colleges, Rix, Whillis, Ballard, Gwynne Evans, Hovell, Tulley, Nichol, Walthier, etc., will be reviewed. Theories concerning jaw development, relations and pressures resulting from oromuscular behavior particularly during swallowing, as well as the evidence accumulated to support these theories, will be discussed. The original work by T. R. Francis, L.C.S.T. on the articulation of English speech sounds associated with malocclusion and infantile swallowing has stimulated some very interesting American research in the field of articulation. Three British films from the Orthodontic Department of

Guys Hospital, London include: (1) A color film comparing normal and abnormal orofacial habits. (2) A cineradiographic study of normal swallowing and speech compared with abnormal swallowing, tongue thrust and associated speech patterns. (3) A color film of several case studies in which the Andresen appliance is utilized to correct the malocclusion produced by a typical swallowing. And individual slide of a cineradiograph will be used to point up significant structures before viewing the cinefilm for those who are not initiated in viewing radiographs.

Functional Diagnosis of Malocclusion. ROBERT M. RICKETTS, *Pacific Palisades, California*—The purpose of this presentation will be to outline some of the methods employed to quantitate differences in the postural relationship of the tongue to the jaws and to evaluate relationship of the tongue to different skeletal morphological variables. In addition, certain studies relative to postural changes in the tongue following orthodontic intervention will be reported. The method employed will be lateral cephalometric films with tracings of selected structures employed for study. The material is selected from cases experienced in private practice. The findings reveal a wide range of tongue posture and posture of the hyoid bone. Individual cases show the hyoid bone to be very low to approximately the level of the sixth cervical vertebra while other cases reveal the hyoid bone to be located well up under the body of the mandible. A wide range of structural variation is also noted. Some patients with extreme dolichocephalic faces or long narrow faces display the tongue well downward, forward and away from the palatal vault apparently consistent with the facial structure. Other cases with short brachycephalic faces suggest that the mouth is literally filled with tongue and the teeth are protruded forward under the influence of a large functional tongue. Certain changes in the level of the hyoid bone and the postural relation of the tongue are shown consistent with Class III surgery and the effects of orthodontic intervention. In conclusion, (1) the X ray is a means of recording the static relationship accompanying certain functional and morphologic problems of the jaw and (2) the X ray indicates that certain changes occur following the removal of adenoid and tonsils, correction with Class III surgery and radical functional therapy with tongue problems.

Orofacial Muscle Malfunction in Relation to Certain Articulation and Voice Quality Disorders. ROBERT HARRINGTON, *Private Practice, Hollywood, California,* and TERRY HOLMAN, *Hollywood, California*—Orofacial muscle pressure imbalance is characterized by great variation in strength and extent of movement within the facial musculature, by "awkwardness" of certain of the mandibular and tongue muscle movements, and by difficulty in separate and discrete movements within the articulatory mechanism. These imbalances may be considered the results of a typical muscle activity developed during the vegative acts of sucking, chewing and swallowing, which in turn are frequently carried over into the movements of articulation. Ultimately they are considered to have some influence on voice quality. Improper vegetative movements of the articulators result in compensatory or "adaptive" muscle behavior, which throws the oral mechanism out of normal physiological balance. Accordingly, (1) certain articulatory disturbances may become secondary to a malfunctioning mechanism, or (2) even when articulation is acoustically correct, it may be so at the expense of distorted or abnormal articulatory movements. These distorted movements are judged to be possible contributors to dentofacial abnormalities. Examination for articulatory distortions associated with abnormal muscle function requires a careful assessment of the oral mechanism, not only with reference to general structure and function of its individual parts, but more particularly to the intrinsic muscles of the discrete organs of articulation. Attention should be directed toward the functioning mechanism both during vegetative and speech acts. On the basis of the assessment a program of muscle exercise designed to provide more nearly adequate muscle balance should be established prior to typical speech corrective procedures. The presentation will include motion pictures to aid in identification of the problem, as well as suggestions for muscle checking. In addition, typical exercises which have seemed to be most successful in creating a well functioning oral mechanism basic to satisfactory articulation will be discussed.

W11—RECENT RESEARCH IN AUDIOLOGICAL REHABILITATION.

Quantitative Assessment of Improvement in Lip Reading Performance of Subjects Taught Via Closed-Circuit Television. HERBERT J. OYER, *Ohio State University*—Within recent years closed-circuit television has been found to be a valuable aid in various areas of teaching. Only very recently, however, has some exploratory work in teaching lip reading via closed-circuit television been done. This paper describes the effectiveness of certain procedures utilized in teaching lip reading by closed-circuit television to a class of 32 Speech and Hearing Therapy students. Measurement of lip reading proficiency was determined prior to training by a filmed test recently developed at Ohio State University. Following the ten week training period the test was re-administered. Statistical comparison of test results reveals a highly significant increase in lip reading performance at the end of the training period.

Selection of Items as the Basis for a Test of Speech-Reading Ability for Adults by Means of a Scalogram Analysis. MARY JANE POSTOVE and R. EDWIN SHUTTS, *Audiology and Speech Center, Walter Reed Hospital, Washington, D. C.*—This study centered about the presentation of a language task to an adult population and the subsequent selection of items, by means of a scalogram analysis, to form a speech-reading test. An experimental test was filmed in color and presented to a population of thirty-one hard of hearing subjects. This silent film test included ninety-nine conversational sentences which ranged in length and difficulty. These sentences were spoken once by a male and once by a female. The data were statistically treated by application of a Guttman model of scalogram analysis to determine whether or not a scale existed in the area. A scale consisting of sixteen items was delineated and subsequently divided into two forms. Pearson product-moment coefficients of correlation between the two subtests and between each test and the Deshon test of speech-reading ability proved to be statistically significant. It is suggested that follow-up studies be done to determine whether the predicted high test-retest reliability of the subtests and the interrelationship among the three tests hold true in actual clinical practice. Since these items were selected by the Guttman method of scalogram analysis, the rank metric method of scoring is feasible. However, a further investigation of scoring the test items is indicated. The possibility of the existence of other scales within the experimental items should be explored. If such scales are found, an attempt should be made to judge which components of speech-reading ability these scales measure. Although the test items were selected for an adult population, their applicability to various age levels should be investigated. (This article is based on a study completed as a M.A. Thesis at the University of Maryland.)

The Relationship Between Audiological Measures and Actual Social-Psychological-Vocational Disability. EMILY M. NETT, *University of Pittsburgh School of Medicine*—The

two purposes of this investigation were (1) to find ways of measuring social-psychological-vocational handicap due to hearing loss, and (2) to relate them to measures of the physical disability. Handicap was defined as inadequate response to auditory failures and the consequent behavior and feelings of aurally disabled persons. It was not defined so narrowly as to include only communication failures, nor so widely as to be synonymous with personal adjustment. The procedure was to interview 378 patients along with 246 persons included in the patients' life constellations—spouses, relatives, friends, and work associates. The social factors recorded were critical incidents (according to a modification of the technique developed by Flanagan), personal histories, intelligence scores, personality measures, and information on how the hearing loss affected the everyday lives of the hard-of-hearing persons. Seven indices of hearing loss were compiled: The Speech Reception Threshold; the Better Discrimination Scores; American Medical Association Percentage Loss; the Social Adequacy Index; the Ciocco-Palmer Scales; a Modified Carhart Scale; and a Six-Ordered Frequencies Scale. The conclusion of the investigation is that aural handicap is comprised of a complex set of variables, the nature of which we have made a beginning in uncovering and measuring. Three important dimensions of handicap are: the network of the interpersonal relationships in which the hard of hearing person is involved, the size and function of the groups he belongs to, and the cultural evaluation of aural disability. The findings have direct application to rehabilitation programs. Hard of hearing individuals can be shown how role relationships and various aspects of group affiliation naturally affect the type of problems they will encounter and their reactions to auditory failures. Counselors can point out to them some of the unique approaches which others have developed to cope with auditory failures. Above all, the results give credence to arguments that associates of the hard of hearing person, particularly family members, should be included in any effective rehabilitation program. (This project was supported in part by the Office of Vocational Rehabilitation, Grant No. SP112-58.)

The Phenomenon of Auditory Extinction. RITA GOTTERER, *New York University Medcial Center;* and ROBERT KARLAN, and DAVID E. DONIGER, *Mount Sinai Hospital, New York City*—This study was undertaken after repeated observations that hemiplegic patients in a rehabilitation center frequently seemed inattentive to verbal instructions given from the direction of their plegic side or in a noisy room, despite adequate language and hearing function. It was proposed by the authors that this seeming inattention in the presence of adequate language and hearing facility might represent the phenomenon of auditory extinction. Extinction has been defined as that process in which a sensation decreases or disappears when another sensation is evoked simultaneously elsewhere in the sensory field. The phenomenon has been demonstrated for cutaneous, visual, taste and auditory sensations. Cutaneous and visual extinction have been studied in detail but information is sparse concerning the nature of auditory extinction. Thirty-three hemiplegic patients were studied who fulfilled 3 conditions: (1) Hearing adequate for reception of verbal commands as determined by pure-tone audiometrics. (2) Language adequate for reception of verbal command. (3) Positive response to the usual clinical test for gross auditory extinction. This test consists of snapping the fingers near one of the patient's ears, then near the other, finally simultaneously near both ears. The patient is asked to report the ear or ears in which he hears the sound. Patients with auditory extinction consistently report the sound as being perceived in only one ear when bilateral stimuli are presented. No learning effect modifies the pattern of response. A variety of sounds were presented to the patients to determine which produce extinction. These included pure tones, white noise, compound noise, jingling keys, bells and speech. Preliminary results indicate that degrees of extinction depend upon the nature of the stimulus sounds. Such factors as the similarity, amplitude, duration and temporal relationship of sounds presented seem to modify perception on the plegic side. The possibility that stimuli other than sound can produce auditory extinction is being investigated. As a result of these findings, changes in the auditory environment of rehabilitation areas have been proposed; therapists should be acquainted with this phenomenon and its influence in the therapeutic setting.

W12—COMMUNICATION DISORDERS OF NEUROLOGICALLY HANDICAPPED CHILDREN: CLINICAL OBSERVATIONS AND METHODS OF ASSESSMENT.

Infant Vocalizations III: Differential Diagnosis of the Cries of Normal and Brain-involved Abnormal Infants on an Audible Basis. LAURA S. ROSENFELD, *Long Island, N. Y. Jewish Hospital* (With Vincent R. Fisichelli and Samuel Karelitz)—This study describes one aspect of a larger study on Infant Vocalizations presently being carried out at the Long Island Jewish Hospital. One question with which the larger study deals concerns the possibility that the cries of normal infants might be recognizably different from those of children with some brain involved disorder. Accordingly, various groups of physicians, nurses, students and others have been and are being tested on their ability to distinguish between "Normal" and "Abnormal" cry samples. These cry samples were magnetically recorded at the hospital on high fidelity equipment and played back in random order to three groups of physicians who were instructed merely to listen and to indicate on paper whether the cry was of a normal infant or an infant with a brain involved disorder. There were 40, 13 and 18 physicians in the three groups the first two of which were tested at Long Island Jewish Hospital on separate occasions and the last group, which was tested at King County Hospital in Brooklyn. All were immediately retested. Results indicate that the performance of these subjects exceeds chance expectancy. For example, some 40 per cent of the first group gave scores within a statistically acceptable range (7 or 8 of the 8 correct) when chance expectancy indicates that only 3½ per cent should have performed in this manner. The reliability of their judgment was found to be high. Similar results were obtained with the other two groups. While these data, based on but four normal and four abnormal cases, may not support the generalization that the population of abnormal infant's cries, is recognizably different from the population of normal infants' cries, they strongly suggest that this is a possibility that should be and is being explored. (Research supported by United States Public Health Service Grant No. M-2875.)

Some Observations on Communication Disorders Accompanying Syndromes of Dysgenesis. RICHARD M. FLOWER, *University of California, San Francisco Medical Center*—The clinician who sees large numbers of children with disorders of speech and language development frequently becomes impressed with the incidence of congenital stigmata among this group. Usually these stigmata are of such limited extent that a clear diagnosis of dysgenesis is difficult. Occasionally, however, congenital stigmata are present of such striking degree, extent, and pattern that the diagnosis of one of the classic syndromes of dysgenesis can be made. Although each of these syndromes is comparatively unusual, we believe that valuable inferences can be made regarding the effects of dysgenesis on the development of communication. Except for the component structural deviations such as cleft lip and palate, dysgenesis has received relatively little attention from speech pathologists or has been erroneously classified with the traumatic encephalopathies. The

paper presents descriptions of patients representing five syndromes: Hurler's Syndrome (lypochondrodystrophy or gargoylism), Moebius' Syndrome (characterized by visual abnormalities and facial paralysis), Turner's Syndrome (an adrenogenital syndrome characterized by retarded growth and sexual development), Adair-Dighton's Syndrome (characterized by blue scleras, fragile bones, and auditory impairment) and Treacher-Collins Syndrome (characterized by multiple mandibular-facial abnormalities. Interferences with the development of communication are found in four different areas: retarded mental development, auditory disorders, structural anomalies, and neuromuscular deficits. It is necessary to assume that occult factors are operating in certain instances, however, since the communication deficits may be greater than can be explained on the basis of the identifiable interferences named above.

A Clinical Study of a Group of Neurologically Handicapped Children. IRENE VARCADOS and EDWARD O'HANIAN, *George Pepperdine College*—The major portion of studies in the area of neurologically handicapped children have concerned themselves with single components of the child, often disregarding relationships existing between these components. This study is an attempt to explore possible relationships between speech intelligibility and perceptual, intellectual and cortical functions in a group of neurologically handicapped children. A Speech Intelligibility Rating Scale was constructed by the authors and consisted of a five point scale describing the degree of intelligibility for each of the 20 neurologically handicapped children used in the study. In addition, each child was administered a Bender-Gestalt, Standford-Binet, Form L., and a review was made of the medical findings. There appears to be relationship between neurological findings and speech intelligibility in this group. However, the relationship does not appear to be on a one-to-one basis. Some children with severe neurological involvement presented minor speech deviations, while others suffering lesser involvement manifested extreme deviations. Speech, intelligence and perceptual organization appear to be related functions. It may be concluded tentatively from this study that the cerebral cortex functions in a global manner. However, within this holistic approach, there tend to be cortical areas which are more related to one function than another; thus, specificity within mass action. (A portion of this paper was submitted as a master's thesis by Irene Varcados at George Pepperdine College under the direction of Professor Edward O'Hanian.)

A Comparison of Scores of Mentally Retarded Children and Cerebral Palsy Children on a Test of Ten Difficult Consonants. ORVIS C. IRWIN, *Institute of Logopedics, Wichita, Kansas*—This report is concerned with the following relationships: (1) a comparison of correct articulation scores of cerebral palsy children with an IQ range of 25-50 with scores of retarded nonbrain damaged children with the same IQ range; (2) a similar comparison of the scores of the two groups with an IQ range of 51-80; (3) a comparison of substitution errors of cerebral palsy children and retarded children with IQ ranges of 25-50 and 51-80; (4) a comparison of omission errors of cerebral palsy children and retarded children with IQ ranges of 25-50 and 51-80. There were 41 retarded children and 50 children with cerebral palsy. The test was constructed by Dale Irwin. The ten sounds were selected by a tally from lists of difficult consonants reported in the literature. In all six comparisons the means of the retarded groups indicate better performance than the cerebral palsy group. In the case of correct scores in the IQ groups 25-50, the differences between the means are significantly in favor of the retarded children. The same is true of the means of the two groups in the IQ range of 51-80. The difference in the means of the CP's with an IQ range of 91-110 and retarded children with an IQ range of 51-80 is not statistically significant. The difference in means of substitutions of the groups in the IQ range 25-50 favors the retarded children but in the IQ range 51-80 the difference is not significant. The differences in means of omissions is not significant for the two groups in both IQ ranges. As far as the articulation of difficult consonants by CP children is concerned there appears to be at least tentative support for the hypothesis that cerebral palsy per se is a factor in addition to mental retardation.

W13—MILITARY AND INDUSTRIAL NOISE.

Aircraft Noise. MAX H. O'CONNELL, *School of Aviation Medicine, Brooks Air Force Base*—All persons associated with the operation of military aircraft receive a hazardous noise exposure during some phase of these operations. This paper is a frank discussion of the hazardous noise levels encountered in and around operational aircraft and consideration of the noise damage risk criterion as it applies to aircraft maintenance personnel. Noise characteristics of several aircraft are discussed, as well as the possible adverse effects of aircraft noise on hearing. The paper discusses (1) Indoctrinating personnel in the undesirable effects of noise, (2) Keeping noisy work areas under surveillance, (3) Personal protective devices, (4) Minimizing exposure of personnel to intense noise and (5) monitoring audiometry in preventive medicine. (The contents of this abstract constitute the personal views of the author and are not to be construed as a statement of official Air Force policy.)

Industrial Audiology at Lockheed Aircraft Corporation. CHARLES I. BARRON, and LOUISE DAVIDSON, *Lockheed Aircraft Corporation*—Industrial audiology has been an integral and key procedure in the hearing conversation program initiated at Lockheed Aircraft Corporation in 1948. Audiometric testing was performed on all applicants for jobs in noisy areas and served to determine the reference hearing acuity of new employees and to establish the feasibility of exposing subjects to noisy job environments. In 1951, precise hearing standards were established using audiometry as the key procedure in the entire program. The program was also extended to include preemployment testing of all new-hires and periodic testing of certain key employees with frequency of testing and interpretation of audiograms quantitated and well-defined. The audiometric studies performed by specially trained nurse audiometrists on over 100,000 Lockheed employees in the last 12 years have served as an important procedure in the placement examination designed to match applicants for jobs and have provided a reference for determining the effect of noise exposure upon the hearing nerve. They have also enabled the Company to successfully contest unjust claims against noise-induced hearing loss by providing a quantitative record of the hearing acuity of each new employee.

A Preliminary Report of the Effects of Gunfire and Other Infantry Combat Training Noises on the Hearing Acuity of U. S. Marine Corps Recruits. G. J. HARBOLD, *U. S. Naval School of Aviation Medicine, Pensacola, Fla.*—Hearing thresholds and questionnaire data were obtained for sixteen platoons (approximately 1000 men) of the U. S. Marine Corps recruits at the U. S. Marine Corps Recruit Depot, Parris Island, South Carolina, prior to a two-week period of small arms fire. Post-exposure audiometric data were obtained after the small arms firing. From Parris Island, most of the subjects (approximately 700 men) were assigned to Infantry Training Regiment, Camp Geiger, North Carolina, for four weeks of infantry combat

training, after which post-exposure data again were obtained from the same men. Certain other considerations included in the study were: (1) One platoon (59 recruits) was fitted with ear plugs which they wore during both exposure periods; (2) Two platoons (125 recruits) were tested immediately after (beginning within 30 minutes) firing the BAR to determine Temporary Threshold Shift and retested one week later to determine recovery; and (3) One company at Camp Geiger (approximately 120 men) which was assigned to mess duty and therefore did not receive the infantry combat training exposure was retested to provide control group data. This preliminary report of the study will be limited to the audiometric data. The results show: (1) Small arms and combat training noises are responsible for hearing loss in high frequencies (above 2000 cps), (2) Hearing loss is most pronounced at 6000 cps, (3) Hearing loss will not occur if ear plugs are worn during these training activities, (4) Hearing loss found after infantry combat training exposures is similar to TTS immediately following small arms fire (BAR), (5) Mean hearing thresholds from serial testing reflect a learning influence that is not consistent throughout the range of the frequencies, and finally (6) the audiometric facility and test methodology selected for this type study is of utmost importance.

Comparison of Losses Induced by Steady Noise and By Gunfire. W. Dixon Ward, *Research Center, Subcommittee on Noise, Los Angeles*—A high-frequency hearing loss can be produced whether by a steady noise or by impulsive sounds such as gunfire. Since these stimuli seem quite different, one might ask whether or not the losses differ in some way. The answer is of practical importance, for example, in assigning liability in an industrial situation. A battery of tests was therefore assembled to be administered to two groups of men showing high-frequency losses but essentially normal hearing at 1000 cps and below: one group consisting of men who had worked in a noisy industry but had never been exposed to gunfire, the other consisting of men who had worked with guns for years but had never held a job involving steady noise. The battery of tests consists of the following: (1) a very detailed audiogram, in order to determine maximum rate of change of hearing level; (2) equal-loudness contours (measuring recruitment); (3) Albrecht effect (tone-decay tests); (4) standard intelligibility tests (spondee threshold and PB score); (5) two speech tests involving only consonants, the Fairbanks Rhyme Test, and a similar consonant-confusion test based on the data of Miller and Nicely; and (6) pitch-matching and interval-adjusting tests, where possible (testing diplacusis). Some of the preliminary results will be presented. (This research was supported by research grant B-2200 from the National Institutes of Neurological Diseases and Blindness, Public Health Service.)

W14—VITAL CONSIDERATIONS FOR SUCCESSFUL APHASIA THERAPY.

Recognition of Cerebral Palsy Symptoms: A Factor in the Molding of Aphasia Therapy. Mildred Berry, *Rockford, Illinois College*—The writer explains the nomenclatures which have been applied to a group of children with severe retardation in the development of oral language. The inadequacies of the labels "brain-injured," "oligophasia in children," idiopathic language retardation" and "congenital ideo-motor apraxia" are described. The neuro-phrenic child is delineated by etymological and descriptive definition. Two kinds of proof may be offered to demonstrate these interrelationships. The first is neurological. It is to be found in the recent researches demonstrating the presence of integral, correlating arcs in the reticular system, and in the charting by Brodal of the proprioceptive pathways in the pyramidal trunk. One concludes from these researches that the systems mediating perception, apperception, and motor expression are anatomically interwoven and functionally constitute a unitary complex. Injury to or deficit in one part is presumptive evidence of injury to or deficit in several areas. The second body of evidence is derived from the study of the total behavior of a group of ten children, diagnosed as aphasic, who demonstrate unmistakable signs of motor dysfunction, of cerebral palsy. Tests suggest that impairment in motor behavior, somewhat less obvious perhaps than sensory and perceptive involvement, is nonetheless a demonstrable physiological disability in this group of children diagnosed only as aphasic. Is the converse true? Does a sizeable group of cerebral palsied children exhibit aphasic symptoms? The writer reports the results of her study of aphasia in six cerebral palsied children in the Spastic Department, Orthopedic Hospital, Copenhagen, Denmark. Our behavioral studies correlate well with the neurological findings by others, and lead to the following tentative conclusions with respect to training the cerebral palsied-aphasic. (1) Ability to understand and use oral language depends upon the functional integration and projection of motor, perceptual, visuo-motor and conceptual arcs mediated, in large part, through the reticular system. (2) Training in perception and integration (for example, temporo and spatial configurations) is necessary but must not preclude simultaneous training of motor patterns. (3) Positioning of the total matrix of the synergy for oral expression is a refinement of positioning of gross synergies, and must precede training in discrete muscle sets (tongue, lips, etc.) If these major conclusions be valid, then the following subsidiary conclusions also are valid: (a) Repetitive drill on single sound units must give way to training in the *organization and production of speech units*. The training should be analogous to that employed for space-perception, foreground-background, etc. (b) "Resistance techniques" should not be employed in muscular training because they are neurologically unsound and disruptive in terms of unitary, graded motor response. (c) Reinforcement and training of proprioception should precede or run parallel with motor training.

Recognition of Psychological Symptoms: A Factor in the Overall Treatment of Aphasia. Mary C. Longerich, *College of Medical Evangelists, Los Angeles*—Illustrations of 14 patients are used in citing the importance of recognizing the psychological symptoms of the aphasic and of planning his aphasia therapy accordingly. The following techniques are indicated: (1) Avoid being over-solicitous with the patient, for this may throw him into a deeper depression. (2) Avoid giving false hope to the patient, for this will only destroy confidence. (3) Avoid talking to the family "behind the patient's back" for this arouses hostility. (4) Encourage the patient's expression of hostility; but do not commit oneself as agreeing with him, lest he later feel guilty and turn upon the therapist. (5) Maintain rapport with the family, in order to elicit their cooperation. (6) Meet each patient's psychological problem with a specific aphasia therapeutic. Effective therapy is only possible when the patients' psychological problems are recognized, and the therapy program planned in light of them.

Medical Supervision: A Factor in the Treatment of the Aphasia Patient. Robert C. Robb, *Pasadena, California*–The Aphasia patient may be in need of three types of medical care. First and most obvious is the need for attention to the continuing pathogenic process initially responsible for his present disability, and also the probable cause of further disability in the not too distant future. Secondly, the patient may profit from help in mastering his anxiety. He is frightened and uncertain about his ability to handle present and future problems on the physical, social and economic levels. The most stable personality would be alarmed by such a threat to his life, liberty and the pursuit of happiness, even if he had an intact brain with which to operate, which these patients do not. Thirdly, the patient may be further handicapped in dealing with his predicament by the onset of a depression. Grief, anger and despair may seriously impair the

best efforts of all concerned, even though, from an objective point of view, the disability is slight and the prognosis good. In most cases depression can be relieved by a combination of medication and psychotherapy, thus promoting the patient's ability to eat, sleep, concentrate and to make the most of his opportunities with courage and determination.

W15—VOICE AND VOICE DISORDERS II: NASALITY.

Regional Growth and Development Disturbances Reflected in Hypernasal Voice. SAMUEL FLETCHER, *University of Oregon Medical School, Portland, Oregon*—Growth and developmental disturbances in the speech mechanisms of a group of children having hypernasal voice without accompanying cleft palate were investigated in this study and a concept of spatial continuity of regional anomaly is suggested. Six girls and four boys having hypernasal voice without cleft palate were used as experimental subjects. The onset of nasality reportedly varied within the group—five had voices characterized by extreme nasality from first attempts at speech; four had normal voice quality until their tonsils and adenoids were removed between two and six years of age, and one was noted to be slightly nasal soon after speech onset with nasality increasing markedly during the early speech years. The ages of the experimental subjects ranged from 4 to 13 years with a mean of 8.8. An equal number of control subjects were selected, matched as nearly as possible with the experimental group according to age, height, weight, and sex. Cephalometric information was also derived from lateral still radiographs of the head-neck region of 11 additional normal children whose names were drawn from the files of the University of Colorado Children's Research Council, Denver. Data were derived from clinical observation, standard speech examinations and three types of radiographic observations: standard lateral radiography, multiple cassette laminagraphy and cinefluorography. Still radiographs were analyzed for growth and developmental disturbances. Cinefluorographic films were analyzed by motion projection and by the tracing of single frames, utilizing a tracing cabinet designed for this purpose. Integration of motion and single frame analysis provides more information than would be obtained from either method used separately. Anomalous involvement of the following structures are identified: lips, teeth, tongue, hard palate, soft palate, pharynx, basicranium and cervical vertebrae. The anatomical structures in head-neck region above and below the lip-vertebrae horizontal plane were apparently normal. Slides presented will illustrate a gradation of anatomic involvement through a distinguishable zone of the facial structures. In some subjects the developmental anomaly was found in the immediate palate-pharynx region; in others, the distortions extended from the lips to the cervical vertebrae. It was found that all structures within the involved segment of this zone tended to be affected by the developmental disturbance. Thus when the anterior and posterior limits of involvement are identified, involvement of the intervening structures can apparently be predicted. These findings are consistent with the mesodermal penetration theory of embryonic development. On the basis of the findings from this study a concept of spatial continuity of regional involvement within the above delimited zone is suggested. Speech implications of these findings will be presented.

An Acoustic and Radiographic Study of Nasality. D. R. DICKSON, *Northwestern University, Chicago, Ill.*—The purpose of this study was to investigate certain acoustic and physiologic correlates of nasality. Three groups of subjects included normal speaking, functionally nasal, and cleft palate speakers. All were adult male Caucasians. Two vowels, (i) and (u), which represent physiologic and acoustic extremes were studied in plosive consonant environment. Lateral head x-rays, nasality judgments by a panel of phoneticians, and spectrographic records provided the data for the present study. Degree of velopharyngeal aperture and severity of nasality showed a high positive correlation for the vowel (i). For (u) the correlation was significant but much lower. Spectrographic measures included formant frequency, intensity, and bandwidth; fundamental frequency; presence and frequency of interformant resonances; and relative strength of individual harmonics. No one of these measures was found to be consistently related to the degree of perceived nasality. However, it was noted that the degree of perceived nasality was related to the number of irregularities in the vowel spectra. This finding is in agreement with other investigations which have indicated that nasality is an extremely complex phenomena and is a function of the structure and function of the entire resonance system. Thus, the acoustic specification of nasality is not only a function of velopharyngeal aperture but also of the configurations of the coupled supraglottic cavity system. Thus variation from person to person and from vowel to vowel in the acoustic characteristics of nasality is to be expected. (This paper is part of a doctoral dissertation under the direction of Dr. Harold Westlake, Head, Department of Communicative Disorders, School of Speech, Northwestern University, Evanston, Illinois.)

Phonetic Elements and Perception of Nasality. L. A. BRIEN, *Houston Speech and Hearing Center Texas Medical Center*—The purpose of the present investigation was to study the influence of some selected vowels and consonant environments on perceived nasal voice quality for both nasal and nonnasal speakers. The vowels were (i), (ɛ), (æ), (ʌ), (ɑ), (U), and (u). The consonants were voiced plosives (d) and (g), voiceless plosives (t) and (k), voiced fricatives (v) and (z), and voiceless fricatives (f) and (s). The consonants were used in CVC syllables with the same consonant preceding and following each vowel, a total of 56 such syllables. Each of the seven vowels in isolation also was included, making the total number of syllables 63. Twenty speakers 10 with nasal voices and 10 with voices free of unpleasant nasality, recorded the syllables in a sound-treated room using high fidelity recording equipment. The voices were chosen by unanimous agreement among three observers experienced in diagnosis of voice quality disorders. The syllables were rated for severity of nasality on a seven-point equal-appearing intervals scale by 35 listeners. Median scale values were derived from their judgments. On the basis of the obtained results the following conclusions seem warranted: (1) on this type of experimental material listeners judge nasal voices as more severely nasal than nonnasal voices; the obtained order of severity of nasality on isolated vowels, from vowel to vowel, and on CVC syllables, from syllable to syllable, is essentially the same for both groups. (2) Nasal and nonnasal voices are, in general most similar in terms of severity of nasality on isolated vowels and most widely separated on CVC syllables. (3) Vowels in isolation are generally perceived as more severely nasal than CVC syllables for nonnasal speakers. (4) Severity of nasality of vowels for all environments combined varies with height of tongue position, with higher vowels less nasal than lower vowels. (5) Severity of nasality of vowels varies with the front-back classification of vowels with back vowels less nasal than front vowels. (6) Syllables with voiceless consonant environments are less nasal than syllables with voiced consonant environments. (7) Syllables with plosive consonant environments are less nasal than syllables with fricative consonant environments. (8) Nasality is least severe for voiceless plosive environments, more severe for voiceless fricative and voiced plosive environments, and most severe for voiced fricative environments. (Abstract of Ph.D. dissertation done at the State University of Iowa, 1959, under the direction of Dr. Dorothy Sherman.)

W16—METHODOLOGY IN THE CORRECTION OF COMMUNICATION DISORDERS.

A Psychologic Modality in Communication Therapy. FAYE G. KATZ and MURRAY M. HALFOND, *Temple University*—Extention of psychotherapeutic principles in communication therapy has seemed desirable inasmuch as such therapy would provide for the psychologic and communication needs at the same time.

While story-telling methods have been used for many years, modification of this technique has seemed to satisfy the need for a holistic approach. In this modality, the child is asked to dictate a story of his own invention to the therapist who copies it down slowly. The therapist often asks for repetitions and restates parts of the story. This method has seemed to serve many purposes: establishment of a relationship in which the child has more control of the session; controlled projection of unconscious material; catharsis; motivation and rewards; modified and slower speech rates; indirect auditory training; self-correction of articulatory errors; and maintenance of continuity of therapy sessions. Application of this technique with different types of communicatively handicapped children has resulted in considerable and continuous improvement. Further application and study is indicated in order to facilitate the development of psychotherapeutic techniques in communication therapy.

The Body Image Concept as a Psycho-Physical Factor in Speech Disorders. JEAN VON REDLICH, *Bill Wilkerson Hearing and Speech Center, Nashville, Tennessee*—The purpose of this study is to investigate the changes in "Self-Concept" as a function of therapy. It is a continuation of a noncontrolled pilot study done in 1958 by this investigator at the University of Alabama Speech and Hearing Clinic. The present study is designed to employ controls of testing (paper and pencil type as well as projective tests) before and after therapy. The therapy structure includes eight adult clients with varying degrees of hearing loss who range in age from 18 to 65. This therapy is being carried out by three therapists, meets twice a week for one and a half hours, and includes both multi-person and individual therapy. During the course of therapy (as in the first study) the function of the cognizance of "body image" and the exploration of the feelings related to it in the total "self-concept" is being explored and experimented with by the clients and the therapists. Implementation of these feelings, as related to total "self-concept," is being carried out by role playing, exploration through verbalization of feelings in relation to "self-others," and through structured speech and lip reading activities. It was revealed in the pilot study that the client showed definite changes, from extraneous and inappropriate movements to more adequate use of his body and hand movements. He began to use speech which was more intelligible in terms of consonant sounds and better handled in terms of rate, and his social and class relationships appeared to be much more satisfactory for him. Based on the findings in the pilot study, it is hypothesized that changes in the functioning of these eight clients will occur in body use and gesture, in more adequate use of speech and hearing, and in the total self-concept. It is also expected that testing before and after therapy will define quantitatively some of these aspects.

Progress Report on Therapy for a Child With a Psychogenic Speech Handicap. J. D. TYSON, ERNESTINE BOWEN, VIRGINIA AKERS, *Texas Women's University, Denton, Texas*—The subject of this report was first seen in the Speech and Hearing Clinic of Texas Women's University as a problem in delayed speech. Difficulty in establishing rapport, long periods of silence in social situations, obvious perceptual proficiency in analyzing components of any environment, and a marked ambivalence between extremely well-mannered behavior and burst of easily-triggered hostility required continued observation for diagnostic purposes during early therapy. Continued and marked inconsistency of speech production indicated a further need for extensive personality evaluation. The diagnostic findings of Bowen Associates are to be reported in detail according to seven different instruments employed for psychological evaluation. The evaluation indicated an unusually high conceptual ability and markedly aggressive tendencies associated with extreme sibling rivalry; the paucity of evidence indicating organic damage or maturational disturbance appeared to indicate that the potential for further development of speech would depend upon intensive parental guidance and extensive association with members of a comparable peer group. Rather serious problems were involved in interpreting the findings of diagnostic therapy in clinic and the results of the extensive personality evaluation to the parents. Following the necessary parent counselling session, therapy for the client was restructured. The therapy was administered by two M.A. candidates Miss La Nelle Bassett and Miss Virginia Akers. Diagnostic findings were compiled under the assessment of Dr. Ernestine Bowen, Clinical Psychologist under contract to Texas Women's University, and the intake examination findings of the Speech and Hearing Clinic, Texas Women's University. The author reporting this paper has had supervisory responsibility for examining and treatment procedures. Brief precise descriptions of activities planned and interaction obtained in the clinical setting between the client and his therapist are to be reported.

A Re-appraisal of the Montessori Philosophy and Methods as Applied to the Education of the Language Retarded Child. MARY JANE REDCAY, *Seattle Public Schools*—This report involves an exploration of the "didactic" materials of Montessori for developing (1) differential visual perception of dimensions, (2) differential visual perception of form, and (3) visual-tactile-muscular perception, in the child with retarded language. To illustrate the report, slides will be presented showing the language-therapist using the "Montessori-Didactic-Materials" with language-retarded children who have demonstrated visual-perceptual difficulties.

W17—TECHNIQUES IN APPRAISAL OF LANGUAGE DISORDERS IN CHILDREN.

A Study of Children With Clinical and Sub-clinical Nervous System Involvements. SHULAMITH KASTEIN, *Columbia Presbyterian Medical Center, New York*—A study of 4,041 patients referred to the Speech and Hearing Clinic at Columbia Presbyterian Medical Center during a 10 year period from January 1, 1950 through December 31, 1959 was made with the purpose of gathering information on children with clinical and sub-clinical central nervous system involvements and disorders of communication. As a result, 873 children of a total of 2,570 children (1,471 patients were adults) were found whose disorders of communication were considered secondary to clinical or sub-clinical involvements of the central nervous system. Prenatal, natal, and postnatal factors were studied. Incidence of staining, miscarriage, blood incompatibility and infections were noted among the prenatal factors. Prematurity, jaundice anoxia, convulsions, endocrine dysfunctions, cardiac conditions and other symptoms in the child were noted and will be reported. A differential diagnostic language evaluation, history, description of the motor, social and emotional development of the child, consideration of his responses to sense stimuli, symbolic behavior, concept formation, and psycho-motor functions were found to be valuable instruments in the detection of central nervous system impairment. In the course of this 10-year period, research studies have been carried out to further validate diagnostic procedures and diagnostic terminology, and the findings so far gathered will be reported. Projective drawings, particularly the drawings of a man and the copy of the Bender Gestalten played a major role in the evaluation of children with central nervous system disturbances, and will be emphasized. Diagnostic categories with regard to specific language disorders have been studied and their implications for language development pathology and therapy will be discussed. Since central auditory imperception has been a frequent finding in this group of children, it will be discussed in greater detail and concomitant clinical manifestations will be stressed as well as differential diagnostic clues. Longitudinal studies on many of the children seen during this 10 year period will be reported, and prognostic criteria, therapeutic management and academic achievement or problems will be presented.

Evaluation of the Levels of Functioning of Various Aspects of Language Behavior in Brain-Damaged Children. ELIZABETH BROWN, *School for Cerebral Palsied Children of Southern California, Pasadena, California*—In carrying out complete

diagnostic studies of the speech and language behavior of brain damaged children many problems are often encountered. At the School for Cerebral Palsied Children, Southern California, speech and language evaluations often extend over a period of several weeks. The evaluative process includes speech mechanism examination, hearing evaluation, breathing, voice, and articulatory analyses, fluency evaluation and language evaluation. On many of the children the last mentioned area, language evaluation, involves the most time and effort for examination and observation. Recent literature in the field indicates that current research is attempting to delineate language norms to which specific studies of the child's language can be compared. Standardized tests in this area are lacking but subtests of psychometric examinations and portions of educational tests and developmental schedules are available to extend the range of diagnostic information available. An attempt is made during a child's residence in our School to evaluate language from the point of view of comprehension and usage. We have found the following evaluative procedures to be of value for our purposes: The Ammons Full Range Picture Vocabulary Test, The Peabody Picture Vocabulary Test, the vocabulary subtests of the WISC and Binet, the Action-Agent Test as described by Gesell, Templin's mean length of response, Ruth Griffiths Hearing and Speech Scale and the language area of the Gesell Developmental Schedule. The battery of information resulting from these procedures provides a basis for objective determination of the levels of language functioning of neurologically impaired children. Disparities between usage and comprehension, or between specific areas of each, often give valuable clues to assist us in arriving at a differential diagnosis. Implications for the most needed areas for future speech therapy are often provided by the testing procedures. The techniques also provide an opportunity for objective estimation of progress by periodic retests. The present paper will include a description of the use of test materials and specific discussions of the applications of the testing procedures by reference to cases which have been studied at the School.

Investigation of the Language Behavior of a Group of Nonspeaking Institutionalized Brain-Damaged Children. SEYMOUR RIGRODSKY, *Vineland New Jersey Training School* and SIDNEY GODA, *Johnstone Training and Research Center, Bordentown, New Jersey*—This investigation was designed to evaluate and describe the language of a group of nonspeaking age from six to twelve years and were residents of the training school at Vineland, New Jersey. Both expressive and receptive language functions were tested and evaluated. The children were observed and tested utilizing the following procedures: (a) Unstructured free play situation. Both expressive and receptive language were evaluated with emphasis on expressive language. Each child was observed in two free play periods: in the Speech Clinic of the Vineland Training School, and in the playroom of his assigned cottage. Individual free play with minimal adult participation was encouraged in the first observation. In the cottage, play was on a group level to stimulate communication. The kind, level, and frequency of gestural and verbal communication, as well as random sound production were recorded by the investigators as they observed the children in play. (b) Structured testing. Both expressive and receptive language were evaluated with emphasis on receptive language. Initially, the comprehension items of the Stanford Binet, Form L, which do not require verbal responses, were administered to each child. The Peabody Picture Vocabulary Test was also administered to each child as a further measure of language comprehension. The last item in the test battery was an object articulation test which had been administered successfully to a large group of institutionalized mentally retarded individuals. To add support to the test results each child's teacher and houseparent was asked to complete a scaled questionnaire describing the expressive and receptive language of the children. Items were scaled in terms of severity and frequency of response. This investigation revealed a wide range in the ability of nonspeaking children to utilize and comprehend verbal and gestural language. This range extends from children who do not appear to comprehend any form of language and rarely use random sounds in their play, to those children who are capable of producing sounds spontaneously during play, imitate words, have highly developed gestural language, and who follow complex verbal directions and commands. Some children with limited expressive language abilities were capable of following complex auditory commands. The greatest verbal output of most children occurred during their free play activities. The results of the language questionnaire appear to indicate that the teacher's and houseparent's evaluation of language behavior were closely correlated with the test results. However, teachers and parents were inclined to accept and encourage gestural language activities without any vocalization in an attempt to maintain communication.

Speech and Language Development of Young Children Born Prematurely. DORIS BRADLEY, *University of Oregon Medical School*—This paper is based on a study of the speech and language development of fifty children born prematurely. Language examinations were given at the six month, twelve month and eighteen month age levels by four members of the University of Oregon Medical School Speech Staff. Preliminary impressions from data indicate that a delay at six months is not necessarily associated with a delay at twelve or eighteen months. A high incidence of upper respiratory disorders was noted for a number of the children evidencing delayed speech.

W18—RESEARCH IN STUTTERING: CHILD STUDIES.

Repetitions in Children's Speech in the First Two Years of Life. H. WINITZ, *University of Kansas*—An investigation was made of the speech sound repetitions of infant vocalizations in the first two years of life. The data for this investigation were gathered by Irwin and his associates, who recently conducted a longitudinal investigation of the speech sound utterances of 95 white infants during the first two and one-half years of life. The sounds were originally transcribed as they were said by an infant on 30 exhalations (referred to as a record). Since the original investigation did not restrict the recording of sounds to consecutive exhalations, an analysis of repeated sounds and sound patterns was by necessity limited to the repetitions occurring within a single breath unit. The breath of each record was classified as a repeated or nonrepeated pattern. It was apparent from the analysis of these patterns that repetitions were characteristic of the speech sound production of infants during the first two years of life. There appeared to be a peak of breath patterns containing repetition at the age of one year and a gradual decrease of repeated breaths from the end of the first year through the second. The results of this study indicate that repetitions are typical of sound production during the first two years of life and do not begin with the advent of linguistic or codified speech. They are only reported as having originally appeared at this time (ages two to five) by certain parents who, for various reasons, have become aware of the repetitious patterns of children's speech at the time when it assumes a linguistically meaningful character. (Master's thesis under direction of Drs. Orvis C. Irwin and Wendell Johnson at the University of Iowa.)

Parents' Diagnosis of Stuttering From Ranked Samples of Nonfluency. CHARLES I. BERLIN, *VA Hospital, San Francisco*—In a study of the attitudes of tolerance of parents toward stuttering children 67 parents of stutterers, 86 parents of children with misarticulations and 57 parents of normal speaking children reacted to the nonfluencies of third grade children. Scripts containing varying amounts of nonfluency were constructed from previous statistical research on normal nonfluencies. The children were instructed to sound as if they were talking naturally. After validation to show that these contrived readings were rankable and undistinguishable from candid samples, the recordings were presented to parents under two

conditions. Condition I: Did the child's speech cause you concern, and if so exactly what did he do that caused you concern? Condition II: Did the child stutter? It was found that the wording of the second condition resulted in significantly more stuttering being diagnosed by all the groups except the mothers of normal speaking children. The amount of stuttering diagnosed was closely related to the amount of nonfluencies intrinsic in the passages and under these conditions parents of stuttering children were not unusually intolerant of nonfluencies compared to the other groups. (Research performed at U. of Pittsburgh as part of doctoral dissertation under the direction of Professor Jack Matthews.)

An Investigation of the Influence of Aggressive Stimuli Upon the Perceptual Response Thresholds of Stuttering and Nonstuttering Children. J. L. ATEN, *San Jose State College*—The current investigation was based upon the need for more intensive, objective studies of the personality structure of children who stutter. The study was designed to evaluate the hypothesis that children who stutter would show greater delay in perceptual response to stimulus material of an aggressive nature than nonstuttering children. Essentially, the prediction was that the stutterers would exhibit delays in perceptual recognition or "perceptual defense" when aggression was introduced as the independent variable. The critical stimulus material consisted of three separate drawings which depicted a child expressing aggression toward an adult male and female figure and a male peer. The noncritical stimulus material consisted of three scenes in which a child was engaged in nonaggressive social interaction with adults or another child. A stimulus was also included which served as a control of visual acuity. Exposure equipment consisted of a visual glare apparatus which provided discrete presentation intervals at varying degrees of masked illumination. The stimulus material was counter-balanced for order of presentation. Responses (oral) were recorded on tape during the actual exposures and later scored according to pre-designated criteria. Nonsignificant *t* test analyses were obtained between the stuttering and nonstuttering groups in response to the nonaggressive social stimuli, and to the adult male and female aggressive scenes. The data did offer evidence for rejecting the null hypothesis of no differences between the stutterer's and nonstutterer's responses to the aggressive peer picture. The results are discussed in terms of the "perceptual defense" or 'avoidance of aggressive theme' tendency of stutterers (which suggested possible inhibition of aggressive activity in peer relationships). Also discussed is the relevance of such a fining to nonfluent speech and the need for control of such variables as order effect and the "social desirability" response factor. (This abstract is based on a Ph.D. dissertation completed under the direction of Dr. M. E. Wingate in the Speech Department, University of Washington.)

Projective Clay Modeling with Speech Handicapped Children. RICHARD A. BARDRICK, *Arizona State University*—Manipulation of plastic material as a psychotherapeutic adjunct has been reported in studies in the literature. Other studies have reported on the use of such materials for artistic and creative productions. This author has experimented with clay modeling as a test procedure, "Clay People," and he has worked to develop a systematic rationale for the investigation of psychometric and psychodynamic aspects of the medium. Use of the "Clay People" technique has pointed to the possibilities of utilizing clay modeling procedures to sample personality variables along a number of different lines: As a three-dimensional medium, it appears to capture body image projections more directly than the widely used graphological techniques. Its plasticity and textural aspects are unique characteristics of the medium through which personality projections can be sampled. The tactual and plastic qualities of the clay have served to release rich expressive behavior that becomes available for therapeutic and psychodiagnostic purposes. The method has proved to be adaptable for use with children who have difficulty freeing expressive behavior. Because speech handicapped children are particularly limited in their communication, clay modeling has been found to be especially appropriate for eliciting expressive behavior with them. This paper reports on the comparison of a group of speech handicapped children with a comparable group of children not having speech handicaps. The comparisons were made on measures assumed to be indicators of conflict and anxiety. It was hypothesized that in terms of these measures the experimental group would manifest more indicators of conflict and anxiety than the controls. Analysis of the findings gave support for the hypothesis of the study, and the test protocols suggested the value of continued investigation in this area.

W19—CONTRIBUTED RESEARCH PAPERS IN AUDIOLOGY.

A Psychological Model of Hearing. JANE C. FARLEY, C. MCCORMICK, P. J. MILLS, *Illinois Institute of Technology*, and WILLIAM WALDROP, *Presbyterian-St.Luke's Hospital, Chicago;* and P. J. MILLS, *Illinois Institute of Technology, Chicago*—In connection with a pilot study on the emotional components of hearing loss, the the authors have developed a psychological model for the *hearing act* (defined as the series of events from the first impingement of the stimulus through the completion of a meaningful response). This model is traced, in psychological terms, to a prediction of the measurable characteristics of the clinical hearing loss, and the psychologically-derived prediction is compared with the empirically-derived audiometric profile. The predictions are made in terms of: (1) the point at which the hearing act is interrupted (from ear to final motor pathway), (2) the frequency and intensity patterns of the audiogram, and (3) various clinical delineations of the response (slowed responses, missing responses, interpolated responses, inconsistent responses, etc.). Validity of these predictions is tested by comparison with: (1) discrepancies between test results at various points in the hearing act (i.e., between standard audiogram and EER-Audio, or standard and EDR-Audiometry, (2) the standard audiogram profile, separated into "low," "speech," and "high" frequencies, and (3) dimensions of the test (EEG pattern, inconsistent audiogram, rapidity of conditioning of EDR, etc.) plus notations on test performance by the testers.

Detection of Auditory Threshold with an Average Evoked Response Computer. E. L. LOWELL, *John Tracy Clinic, Los Angeles*—This paper describes the application of analog computer techniques to the detection of auditory threshold. A relatively simple special purpose computer (Vannus I) which provides auditory stimulation, and the gating, integration, and storage of EEG information from the scalp of human subjects, will be described. Auditory stimulation in the form of short clicks is presented monaurally by earphones to the subject. EEG information from the scalp is fed back into the computer which gates the input, integrates it, and stores it over a pre-determined number of stimulations. The computer can be programmed to provide wide variations in stimulus intensity and duration, stimulus repetition rate, sample size, and gate width and placement. Individual and group data showing the systematic change in waveform of the evoked responses with changes in the stimulus placement will be shown. A comparison of computer thresholds with subjective thresholds for the same subjects show a high correlation. The use of control runs will be described and group and individual variance data presented. The potential value of this type of biological computer in eliciting basic physiological information on auditory functioning, as well as its practical application in testing young deaf children and cases of suspected malingering and retro-cochlear involvements, will be discussed. The simplicity of construction and operation of the computer will be stressed. (This research was supported by a Research Grant from the Bureau of Crippled Children Services, Department of Public Health, State of California, and the Children's Bureau, U. S. Department of Health, Education and Welfare.)

Comparison of Bone Conduction Thresholds Obtained at Three Positions on the Head. GERALD A. STUDEBAKER, *Veterans Administration, Washington, D. C.*—Pure tone bone conduction thresholds were measured with the vibrator placed at the forehead, the vertex, and the mastoid of 20 subjects with normal hearing and 39 subjects with conductive hearing loss. The thresholds were compared to determine which position had (1) the lowest thresholds, (2) the smallest intersubject and intrasubject variability, and (3) the greatest independence of measured thresholds from pathological conditions of the middle ear. A 300 cps band of noise centered at the test tone was used to mask one ear during one part of the testing. The noise intensity was determined for each subject individually by a formula which considers the extent of the subject's hearing loss, the frequency of the test tone, and the type of noise. The subjects with normal hearing were tested three times to obtain a measurement of the intrasubject variability at each of the positions. The vertex does not have a clear advantage over the other two positions on any of the investigated variables. The mastoid and the forehead each have one distinct advantage as a position from which to test the bone conduction threshold. The mastoid thresholds were found to be 9 to 16 db lower than those measured at the forehead and 7 to 12 db lower than the vertex thresholds. However, the forehead thresholds seem to be significantly less affected by the condition of the middle ear than thresholds measured from the mastoid or the vertex. The measurements of variability also favor the forehead position, but not conclusively. The intersubject variability is significantly smaller at the forehead that at the mastoid for subjects with normal hearing, but there are no significant differences in the intrasubject variability. Further, the variability of the measurements of subject with conductive hearing loss was smallest at the forehead, although the variability was not significantly smaller than at the mastoid.

Some Effects of the Prior on the Second Number of a Monaural Click Doublet. NEWMAN GUTTMAN and LAWRENCE FRISHKOPF, *Bell Telephone Laboratories, Inc., Murray Hill, New Jersey*—Some effects of the prior on the second member of a monaural click doublet were studied by means of critically fusing by binaural interaction the second number with a single contralateral click. Under the procedure, zero interaural time difference at fusion is taken to indicate that the contributing clicks are of equal effective intensity. A positive time difference (the second member leading the contralateral click) is taken to indicate that the effective intensity of the second member is diminished, a negative time difference that the second member has been, in some sense, facilitated. By critical fusion is meant immobility of the fused phantom click upon reversal of inputs to the ears. In the easiest conditions, accuracy of measurement can be as good as 10 microseconds. Among the independent variables repetition rate was 1 cluster per second; monaural time separations between clicks were 1-240 milliseconds; second-click levels were 16 and 36 db SL; and prior-click levels ranged widely. The results show that for some monaural intervals and prior-click level equal or greater than second-click level, fusion could not be made (forward masking). Under such conditions that fusion could be obtained, interaural time shift was positive. These positive effects lasted for monaural intervals at least to 60 milliseconds. They are also seemingly compatible with appropriate physiological data recorded in cat. Negative time shifts occur only for monaural intervals of 2-10 milliseconds in conjunction with a prior click weaker than the second. Under certain conditions, the prior click may be effectual even at −6 db SL.

W20—CONTRIBUTED PAPERS ON CLEFT PALATE.

Variations in Normal and Abnormal Velopharyngeal Valving for Speech. KENNETH R. BZOCH, *Northwestern University*—This paper purposes to present the findings of over three years of roentgenographic cephalometric investigation of velopharyngeal function or normal and cleft palate subjects during the production of speech sounds. To date, over 100 normal subjects in different age ranges including pre-school, school age, and adult groups have been studied. Lateral cephalometric head plates using the standard orthodontic procedures were taken of these subjects while the palate was at rest and during the production of syllables containing different types of consonant phonemes. Tracings were made of the position of the soft tissues during the production of these syllables in speech and a detailed metric analysis was made in order to ascertain what patterns of function and what variations in patterns could be determined for the normal population studied. Variations in the extent of velar closure on different phoneme types and the differences in velopharyngeal function at different ages of development were also determined. Using the first study as a control a second investigation of abnormal velopharyngeal function in postoperative cleft palate patients was begun a year age. Using identical control the series of 50 cleft palate patients have now been studied to determine differences from the normal in their mode of velopharyngeal function. Cleft palate patients were classified by type of cleft and extent of velopharyngeal insufficiency. Findings to date lead to the following tentative conclusions: (1) The soft palate of both normal and cleft palate subjects increases significantly in length during the function for speech as compared to rest position. (2) With the exception of those patients having unusually large adenoid development, closure takes place in the third quadrant. (3) The multi-velopharyngeal function and the extent of closure is similar for all normal subjects during the production of pressure sound syllables of all types. (4) The mode of velopharyngeal seal for the cleft palate subjects is considerably different than that of normal subjects. Other findings which will be discussed include the position of the palate in normal subjects during the production of nasal sounds and variations in findings of the extent of seal or lack of seal during sound production which are related to the method of roentgenographic study rather than to physiological variations. (This investigation has been supported by Public Health Grant D-405 at the Northwestern University Cleft Lip and Palate Institute.)

Oral-Pharyngeal Correlatives of Speech Characteristics in Adults with Unrepaired, Incomplete Cleft Palates. JOSEPH S. KEENAN, *North Carolina Baptist Hospital, Inc.*, MCKENZIE W. BUCK, *University of Florida*—A group of 20 Puerto Rican adults with incomplete, unrepaired cleft palates was studied. Cephalometric X-ray studies were made at physiologic rest and during the phonation of three vowels. Each subject recorded a word list on which was based ratings of the normalcy of his articulation and oro-nasal resonance. Physiological measurements and acoustical ratings were compared against similar measurements and ratings taken from a control group and taken from another experimental group with complete, unrepaired cleft palates. Finally, correlations were computed between physiological measurements and acoustical ratings of the experimental subjects. Like the group with complete, unrepaired cleft palates, the present experimental group displayed consistently larger velopharyngeal openings and wider maxilla. Less consistent differences included some variability in tongue positions and mouth openings. Few significant differences were noted between the two cleft palate groups. Analysis of the acoustical ratings revealed that, for the most part, the same sounds were misarticulated among both cleft palate groups, but the frequency of misarticulations was lower among the incomplete cleft subjects. Both cleft palate groups received highly similar ratings of oro-nasal resonance, with over half the subjects of each group being judged as severely deviant. A high count of phonetic errors was significantly correlated with wider maxilla, and more deviant oro-nasal resonance was significantly correlated with a tongue held lower and further back on the vowel [i]. Insignificant correlations with velopharyngeal openings apparently indicate that these

openings were well beyond the critical point for all experimental subjects. (This paper was abstracted from the doctoral dissertation of Joseph S. Keenan, prepared under the supervision of Dr. McKenzie Buck.)

An Investigation of the Relationship Between Habitual Speech Levels and Adequacy of Speech of Speakers with Cleft Palate. KENNETH LUTZ, *University of Pittsburgh*—The purpose of this study was to investigate the relationship between the habitual levels of speech intensity employed by speakers with cleft palates and the adequacy of their speech. Measures of articulation proficiency, speech intelligibility and nasal voice quality were obtained from 98 adults with cleft palate whose relative habitual speech intensity levels had been determined. The correlations between relative habitual speech levels and articulation proficiency and intelligibility were negative for both male and female subjects. Positive correlations were observed between relative habitual speech levels and nasal voice quality. None of the correlations was significant. The relationship between judged accuracy of articulation for each of 89 consonant sounds tested and the speakers relative speech signal level was also determined. The Phi coefficients obtained indicated that there was no significant relationship between judged accuracy of articulation for each of the consonant sounds tested and habitual speech intensity level. Though there were no significant relationships observed, there was a consistant tendency for persons with the greater speech handicap to speak more loudly. On the basis of these results it would seem that the dynamics of intensity of phonation and its relationship to overall speech output should be investigated further, and that attempts to modify speech intensities in the clinical management of the individual with a cleft palate should be employed with caution.

An Evaluation of Subject Classifications Used in Describing the Articulation Errors of Individuals with Cleft Palates. KENNETH L. MOLL, D. C. SPRIESTERSBACH, and HUGHLETTE L. MORRIS, *University of Iowa*—Previous studies of the articulation errors of children with cleft lips and palates have frequently examined the data obtained from given samples without attempting to classify the subjects on the basis of the nature of the defect, the nature of the procedures used in establishing continuity of the structures, or the functional adequacy of the articulatory mechanism. In these instances the assumption has been made that the groups were homogeneous in articulatory performances. The thesis of the present study is that this assumption is not valid and that a more meaningfull decription of the articulation of children with clefts can be obtained by considering various subclassifications of this population as separate subject groups. In this investigation the 176-item Templin Articulation Test was administered to 124 children with cleft lips and/or palates. Separate analyses of the correctness of each individual test item were carried out with the subjects classified according to age, type of cleft, type of physical management, and adequacy of velopharyngeal closure. Articulation errors of consonants were also analyzed as a function of the manner of phoneme production, place of phoneme production, voicing, position of the phoneme in the word, and adjacency to other consonant phonemes. The results of this study tend to confirm the observations that individuals with cleft lips and palates do not represent a homogeneous group with respect to articulatory ability, that the concept of "typical cleft palate speech" is meaningless, and that descriptions of the speech errors of individuals with clefts can be meaningfully made only for appropriately defined subgroups of this population.

THROUGH THE BARRIERS OF DEAFNESS AND ISOLATION

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THURSDAY, NOVEMBER 3

Th1—PROGRAMS AND GOALS OF NATIONAL PROFESSIONAL SERVICE ORGANIZATIONS.

Summary: Representatives from national professional service organizations will discuss the contributions of their groups to the fields of speech pathology and audiology and will consider the relationships between and among the various organizations. The National Rehabilitation Association, the National Society for Crippled Children and Adults, the American Hearing Society, and United Cerebral Palsy will be represented, with the program chairman being a member of ASHA.

Th2—PUBLIC SCHOOL CERTIFICATION: A DILEMMA.

Summary: The broad problems of certification for public school speech clinicians will be discussed by representatives from a state department of education, a training institution, and the Committee on Clinical Certification. Specific requirements will be considered only as they contribute to the understanding of the broader topic.

Th3—SOME NEEDS IN THE TRAINING OF PUBLIC SCHOOL CLINICIANS.

The Therapist's Role in the Community. C. M. CARNELL, JR., *Wheeling, West Virginia Society for Crippled Children*—To get his program across the therapist must be a part of the community. He must be a member of many groups and must speak to many different types of organizations, sometimes on subjects unrelated to speech therapy. He must appear at board meetings, take part in discussion programs, and set a good overall speech example. The background and training of many speech therapists do not fit them for such a role. Many have never had a course in public speaking, discussion or conference techniques. Many get their first glimpse of what the future is to be like when they are faced by the prospects of an oral examination at the Master's level. Others first become aware of this when they are invited to their first PTA meeting as the guest speaker. When the therapist arrives in a new community, particularly one that has had no previous therapy program, he is regarded as an expert in "speech." The success of the program depends not only on how effective he is in the therapy situation but also on his ability to relate himself and his program to the community. Unfortunately numbers of therapists are unprepared for this and resort to numerous devices for avoiding circumstances that would point up their inadequacies. The contention here is that the better a person is prepared as one capable of taking part in or leading a group discussion or speaking to the community service organizations the better he will be prepared to discharge his obligations to the community. The training centers must recognize this and incorporate into their programs more discussion courses, more provisions for students to interpret their work to organizations, and more oral questioning sessions. A speech therapist who is not trained to interpret his program to the community is not fully prepared no matter how many credits in correction he has or how many hours of clinical practice.

Liberal Arts College Training for Basic Certification. VELMA B. HISER, *Grinnell College, Grinnell, Iowa*—The preparation of the Speech Clinician for Basic Certification at Grinnell College is organized within the framework of a small liberal arts college. This program has been in operation at Grinnell since 1937. At present the course of study includes 67 hours of required courses in liberal arts subjects; a speech major of at least 30 hours, 23 of which are in Speech Correction; courses totaling 25 hours leading to Certification in Elementary Education, and seven additional hours in Psychology. One hundred and twenty-five hours are required for graduation. Courses in Speech Correction sequence start in the sophomore year, and clinical observation is begun at this time. In the Junior year clinical practice is begun in the college clinic and the public schools. Guidance and constructive help is given the student clinician by observation, individual and group conferences. The college clinic is housed in one of the regular classroom buildings and includes one small classroom and three small clinic rooms, one partially sound proofed. A minimum of equipment is required for the program. It includes 3 combined mirrors and blackboards, small table and benches, one tape recorder, one record player, and one audiometer. Slide and movie projectors are available for use. The staff is composed of one full-time Associate Professor, who holds AC, and one Public School Clinician BC, two half days a week. Practically no formal lectures are given in class. Class periods are devoted to discussion, student questions, student's and instructor's answers, showing of movies and slides, and case presentation and demonstration. Some of the features of the Grinnell Program are early combining of subject matter and clinical practice; strong emphasis on understanding self and others; classes for undergraduates only, special emphasis on first learning a few basic techniques well before undertaking others; developing confidence and self-reliance; inspiring to improve professional knowledge and skill and developing skill in communicating effectively. The chief objective of the Grinnell program is the development of a broadly educated, well-informed, technically skilled speech clinician, with intellectual curiosity and emotional stability, who enjoys living and working with others.

The Role of ASHA. VERNON J. SMITH, *Wisconsin Department of Public Instruction*—ASHA is a professional organization. Its responsibilities include the development of professionalism in the field its represents. Before any development can begin it is necessary to investigate the nature of its membership. Concerning public school therapists it seems necessary to know just what the therapist should know and what her capabilities should be. Only when we have some degree of uniformity in background can we present an easily recognized professional profile. ASHA is looked to for leadership and status. It in turn must aid in developing and maintaining this status. If it is to influence the field of public school therapy, its influence must be felt during academic training and "on the job." In academic training ASHA can clearly define what a public school therapist should know and what his responsibilities should be. In "on the job" training ASHA can give greater support to first year people with their expected anxieties in a new position. For the experienced person, it can help him grow into a better therapist. The need for speech therapy in the public schools is very great. The need for ASHA to promote status in the public schools is just as great.

Th4—SPEECH AND HEARING SERVICES IN THE COMMUNITY.

Discussion Forum for Directors of Speech and Hearing Centers. FREEMAN MCCONNELL, *Bill Wilkerson Hearing and Speech Center, Nashville, Tenn.*—This program will feature informal discussion following short presentations by four key discussants, who will focus on specific problems confronting directors of clinical programs. It will be the intent of the four key discussants to present points of views based on their experience, but at the same time raising alternative viewpoints to encourage discussion from and within the group. The four major topics to be covered include the following: Effective Use of Board Committees by the Executive Director, Financing Problems, Report Writing, and The Place of Research in a Speech and Hearing Center.

Responsibilities of the Hospital Clinic. BRUCE GRAHAM, *Henry Ford Hospital, Detroit*—The hospital Hearing and Speech Clinic plays a somewhat unique role in any community. Established as it is within a medical setting, it is designed to function in a close interrelationship with many of the Divisions within the hospital, and perhaps one of its key roles is that of the interpretation of medical information associated with hearing and speech deficiencies for the educators, whose function it is to carry out the longer range rehabilitation program. Equally important is the problem of interpretation of the educational implications of speech and hearing problems for the medical specialist. Because of the nature of most hospital clinics, hearing and speech services may be predominantly diagnostic. The modern otologist expects detailed audiologic evaluations, with a high degree of accuracy, which will assist him in the diagnosis of the type of hearing loss present as well as in the determination of possible medical or surgical procedures and the degree of success one might expect from such techniques. With sensory-neural types of hearing impairment, it is the responsibility of the Hearing and Speech Center to make appropriate recommendations for rehabilitation utilizing the resources of the community into which the child will return to the fullest. This necessitates a close working relationship with the public schools in the community, university facilities, and even an understanding of the availability of facilities at the state level. The facilities provided in a hospital setting are necessarily altered from Clinic to Clinic in accordance with the availability of service in other existing agencies. It is not only possible but is considered necessary, in order to carry on an effective hospital Hearing and Speech Center, that the personnel of this Center know and work in close cooperation with the variety of medical specialists within his own hospital and also with clinicians, speech correctionists, teachers of the deaf, and special educators throughout his community. An interest in the welfare of each specific child and the development of his capacity to the utmost must be of greater concern than jealously guarding one's rights to the handling of a given patient.

The Community Agency Clinic. JACK ROSEN, *New Orleans Speech and Hearing Center*—Differences among various types of speech and hearing services are differences of emphasis, not primarily of purpose. The community speech and hearing service, unlike others, is directly supported by its clients and by community resources rather than by an institution devoted to purposes other than speech and hearing. It is independently adminstered and is therefore free to institute policies based upon principles established by our own profession. Because of its independence the community clinic has responsibilities which are not necessarily shared by other types of speech and hearing services. Services should be available to the entire community, rather than to segments of the population selected for the convenience of the program. Self-discipline must be exercised to maintain and develop a balanced program to serve the various needs of the community and to limit the activities to those which are appropriate to the profession. Its professional independence and its public responsibility require the highest professional standards and ethics. The primary functions are diagnostic and therapeutic, in suitable proportion; neither diagnosis nor therapy alone is an adequate service. The present state of the art requires that there be constant re-appraisal by organized applied research. As a community service, the speech and hearing center has the responsibility to educate the public and other professions regarding speech and hearing problems and the role of the profession. Secondary functions may include special education projects, such as nursery schools for the deaf, but these are viewed as pilot programs only. When appropriate personnel is available, social casework, psychometrics and psychotherapy, remedial reading, and social club and settlement house activities may be undertaken as adjuncts to the basic speech and hearing clinical functions.

Speech and Hearing Services in a Rehabilitation Center. GEORGE KURTZROCK, *Rehabilitation Institute of Metropolitan Detroit*—The Speech and Hearing Department in a Rehabilitation Center can provide a unique and versatile facility to those in a community with communication disorders. In addition, the department which is well organized and staffed can provided an important liaison between the Speech and Hearing Profession and the many other disciplines represented in such a Center. Treatment of most of the severe communication disorders can, of course, be best accomplished in a facility where there is close coordination between the medical, psychological, social and Speech and Hearing services.The comprehensive rehabilitation programs for the adult aphasic and the brain-injured child are the most obvious examples of this need for coordination. In addition, however, many hearing problems, voice problems and other organic disorders require multiple services. The Speech and Hearing Services in a Rehabilitation Center need not be limited to those in immediate need of other services, however. Despite the fine services provided in the public school systems, many of the communication disorders cannot be adequately treated within the practical limitations of such facilities. The artificially contrived "case loads" and the regularly scheduled "breaks" are not conducive to the best therapeutic procedures. Most University Clinics are similarly handicapped. In the areas of research and training as well as service, the Speech and Hearing Department in a Rehabilitation Center can make major contributions. Multi-discipline research is contributing more and more to our understanding of the handicapped. Cooperative programs between University Training Centers and Rehabilitation Centers can provide for both research and training. The potential as an intern training facility for Speech and Hearing Personnel is almost unlimited. Liaison between Speech and Hearing Personnel and personnel from other disciplines is most important. Professional acceptance and understanding is, of course, a primary factor in the maturation of any discipline. Daily contacts, staff conferences and in-service education programs offer ideal opportunities to promote a good understanding of Speech and Hearing among other professions.

Developing an Effective Health Department Program. L. DENO REED, *Pennsylvania Department of Health*—Hearing conservation programs develop at various levels in attempts to meet the needs of hearing impaired individuals. Such programs will be most effective when the following aspects are given full consideration: (1) Identification procedures; (2) Diagnostic and treatment procedures; (3) Habilitative and rehabilitative procedures; (4) Special education procedures; (5) Research, and (6) Coordination of activities. The aspect of identification should bring into focus the size and nature of the problem as the first step. Specific criteria for referral by parents, teachers, and others must be stablished. Hearing screening techniques of a uniform nature will aid in the early identification of individuals suspected of having impaired hearing. The next step would be more definitive testing, hearing threshold measurements. Up to this point, the problem has only been identified. This will in turn channel the individual to the proper place for more complete diagnostic studies. Diagnosis is to be provided by competent medical specialists. A thorough examination by an otologist is required to provide information of a medical nature. Audiologic studies will be helpful to the otologist to establish or confirm his diagnosis. At this point a remedial medical or surgical care should be provided. When no further medical or surgical care is indicated, the activities of habilitation are to be considered. Careful planning must be made to provide for habilitation procedures which may include proper selection of a hearing aid, auditory training, speech reading and guidance, and counseling. These activities many times must be planned on an individual basis. In many instances these can be part of the special education services. All the information and study to this point aids in the proper educa-

tional placement of the individual with impaired hearing. Decisions must be made for placement in one of these five education environments: (1) Residential or day school for the deaf; (2) Special class for the hard of hearing; (3) Regular class placement with special help on an itinerant basis; (4) Regular class with special help provided at a hearing and speech center; (5) Special help for the individual and parent counseling outside the classroom. This is especially important for children of preschool age. Out of all these activities should evolve research which would aid in improving services, modifying specific techniques, and provide for constant evaluation of all aspects of the program. In order for the research to be beneficial, careful planning must be carried out. Finally, the key to making the program effective is the coordination of all activities. No one discipline, profession, nor individual can carry on all the necessary activities in an effective hearing conservation program. Coordination will be effective if the individuals involved communicate with each other and frequent contacts are made in planning as well as actually carrying out certain aspects of the program. In Pennsylvania attempts are being made to make its hearing conservation program an effective one. At the present time, services which include school hearing screening, diagnostic and treatment services, purchase of hearing aids, and therapy services are coordinated through the Division of Maternal and Child Health. The administration and coordination of these activities are the responsibility of the Audiologist Consultant. Not all services are provided directly by the Department of Health. However, provisions are made for certain aspects of the program to be carried out by the medical profession, welfare agencies and the Department of Public Instruction. There is also close liaison with the State Bureau of Vocational Rehabilitation. All problems of administration and coordination have not been solved. But the Commonwealth of Pennsylvania is closer to uniformity of services than it was three years ago. It is not possible to relate all the details in a paper of this nature. Further information will be provided at the time of the actual meeting at the ASHA Convention in November, 1960.

Th5—SPEECH PATHOLOGY IN OTHER COUNTRIES.

Speech Pathology (Logopedics) in U.S.S.R. RUTH CLARK, *University of Denver*—This paper is a report on information gained during a five week visit with the Comparative Education Society to the U.S.S.R. in the Fall of 1958. Research in the area of Speech Pathology, training therapists, and overseeing speech correction in the U.S.S.R., is carried on by the Institute of Defectology. This Institute is concerned with studying all problem deviations, such as deafness, blindness, speech defects, and mental retardation. Team work between specialists in different areas is stressed. The Institute of Defectology is one of the divisions of the Pedagogical Academy and serves children only. The Department of Logopedics, or speech disorders, of the Institute, has a special clinic in which to conduct experiments and decide on techniques and methods to use, with children who have speech problems. The Minister of Education uses the results of the experiments in textbooks and manuals. In this Institute, as with other educational establishments, there are preschools and nurseries for exceptional children, as well as special elementary schools for them. Of these special schools, more than 70% are boarding schools, and the majority of these are in the rural areas. For children with slight speech defects, special teachers are employed in the regular schools. The course of study in the Institute of Defectology is 5 years, with students taking Anatomy; Logopedics, of which 80 hours is theory and 60 hours practice; Organic Defects; Aphasia; Articulation problems; Stammering; and Techniques of Speech. Besides these specific speech courses they have work in psycho-therapy and auditory training. In therapy for articulatory problems, pictures for tongue placement to produce sounds correctly are used along with "zonds." A zond is a wire apparatus to put the tongue in a certain position for the correct production of a sound. The Director of Logopedics at the Institute in Moscow felt that it was important to use zonds in speech therapy. She said that articulatory mistakes could be "cured" in two days with the help of zonds. Her enthusiasm for this particular technique was not shared by some of the administrators in the other Republics. A didactical method of going from the easy to the complicated in 7 different steps is used in the Ukraine Republic to overcome stammering. Stammering was classified in three categories: (1) Vocal stammering, in which special exercises for the voice were given; (2) Breathing stammering, in which diaphramatic breathing was stressed; (3) Articulation stammering, in which tongue and lip gymnastics were used. A variety of different types of speech problems was demonstrated by workers in different cities. They displayed a good deal of interest in research and in developing more and better techniques to help speech handicapped individuals.

Speech Pathology Programs in Scandinavian Countries. MILDRED BERRY, *Rockford Illinois College*—Rather detailed aspects of the habilitation program for the speech-handicapped and of the training of teachers of speech correction in Norway will be given. This presentation is the result of experiences as a Fulbright lecturer in speech pathology at the University of Oslo Medical School, Norway (1952-53), and in Copenhagen and Aarhus, Denmark (1956-57).

Speech Pathology in Japan. MARTIN F. PALMER, *Institute of Logopedics, Wichita, Kansas*—Work with the deaf in Japan dates back to 1875. Concern for the hard-of-hearing and those disturbed in speech, however, dates back only to the passage of the Compulsory Education Act in 1945, and subsequent amendments in later years. No training programs exist in Japan for speech pathologists or audiologists, except in the field of the deaf. As a result, all audiology is being done by otologists, with the exception of one or two persons who have studied abroad. Speech Correction, where it is done at all, is being done by physicians and nurses trained by the heads of surgical and medical departments. In January, 1960, only one public school speech therapist was at work. Similar difficulties exist relative to the establishment of minimum standards for fitting of hearing aids, and so forth. The Japanese government is concerned about these problems, and is taking steps to correct them. However, in the field of hearing, and to some extent in speech, a tremendous amount of basic research is being done, some of which is perhaps even more advanced than in this country. The weakness is individual rehabilitation.

Th6—PRIVATE PRACTICE: FULL-TIME OR PART-TIME.

Considerations in Initiating a Private Practice. MICHAEL J. D'ASARO, *University of California at Los Angeles—Special Qualifications:* The professional and community responsibilities inherent in the assumption of authority that accompanies the titles Speech Pathologist or Audiologist demand additional preparation beyond A.S.H.A. certification. The areas of special qualifications associated with private practice include: (1) Wide diagnostic experience. The varied types of problems seen by the private practitioner can be adequately identified and managed only by persons with diversified experience. (2) Knowledge of when to refer. At times, a greater professional service can be supplied by proper referral than by attempting to work with a case for whom maximum service cannot be provided. (3) Knowledge of where to refer. The private practitioner must know the public and private agencies providing services in his and allied areas. *Sources of referrals.* Professional activities can lead to referrals from: (1) Hospital,

university, institutional, or other clinics. These provide the double advantage of experience with a variety of cases and eventual sources of referrals. (2) The Medical profession. An important source of referrals is the medical doctor. The opportunity to demonstrate one's skills is provided by clinical affiliations where cases are seen for staff review. *Problems of capitalization.* Most business ventures require an outlay of capital in some form. Demands for physical needs are not so heavy in speech pathology as in audiology, but other needs exist: (1) Allowance for period of limited income. The discouragement and apparent failure of some ventures into private practice were probably related to this factor. Not only does the uncertainty create stress, but there can be serious interference with professional judgment when any single case is economically critical. (2) Providing adequate physical facilities. Capital outlay is required to establish a professional setting. A variety of settings will be discussed. *Business relations in a profession.* Consideration must be given to a variety of business problems, such as: (1) Establishing fees. (2) Maintaining records. (3) Establishing cancellation policy. (4) Qualifying for business licenses. (5) Tax benefits.

Private Practice in Speech Pathology in Addition to Full-Time Service on a University Faculty. GEORGE SHAMES, *University of Pittsburgh*—It is certainly a challenging task to discuss private practice in speech pathology as an adjunct to a full-time university faculty position. Because of my own experiences in this dual capacity I will probably consciously and unconsciously call upon by own background and experience, but I will try to keep the personl "case-study" themes within this paper to a minimum. However, let me first state a personal philosophy concerning private practice in speech pathology. From the viewpoint of professional services to those needing speech and hearing therapy, the well-trained, competent and independent private practitioner should ultimately become one of our primary instruments of therapy. Too often our top level, more advanced trained people are channeled away from clinical duties into training and research. It seems possible that some facets of our own profession are serving to retard the optimum services which could be offered to society. Insofar as the dual job of private practice and a university faculty position are concerned we can discuss several major points, both positive and negative. On the positive side are: (1) Opportunity for clinical contact, (2) Material for teaching, (3) Research opportunities, (4) Additional and unique training facilities, (5) Financial rewards, (6) Public and professional education. On the negative side are: (1) Conflict of interest, (2) Expenditure of time and energy, (3) Lack of professional contact and stimulation with colleagues, (4) Added expenses. It seems, however, that these several issues can be brought into proper balance and that within the limits of the individuals involved in working both for a University and privately that each can resolve these things for himself. My feeling is that under certain conditions an individual can do both. I also feel that private practice either on a part- or a full-time basis needs an organized and systematic program of careful selection and recruitment, and support from the other elements of our profession.

Private Practice in Audiology in Addition to Full-Time Service on a Medical School Staff. MAURICE H. MILLER, *Kings County Hospital Center, Brooklyn, New York*—The author's experience in organizing and conducting a part-time private practice in audiology during the past three years will be described. Minimum items of audiological equipment for evaluation and short term therapy include: (1) a two-channel diagnostic audiometer with a bone conduction oscillator and microphone circuit. (2) a speech audiometer or hearing evaluation unit with microphone, complex voice, phonograph, and tape inputs, (3) a power amplifier, external loud speaker, etc., for sound field audiometry, and (4) an auditory training unit, with phonograph, microphone, and radio inputs. Desirable additional items include: (1) tape recorder, (2) prefabricated two room testing suite, (3) sound field testing setup for binaural hearing aid evaluation, and (4) earmold impression materials. The majority of referrals to the private practitioner in audiology should come from the otolaryngologist. Personal meetings with otolaryngologists in the community in which the audiologist establishes his practice are necessary in developing referral sources. Referrals may also be accepted from hearing aid representatives provided arrangements are made for an otological examination of the patient and provided the representative understands that the audiologist is not limited in his recommendations to the products of a particular manufacturer. The types of reports which the audiologist prepares for referring physicians will be described. Forms for interviewing the patient, recording the results of the audiological evaluation, and making referrals to hearing aid dealers will be demonstrated. Ethical problems associated with the audiologist's relationship with members of the medical profession particularly otolaryngologists, hearing aid representatives, and other personnel will be considered. An audiologist who is associated on a part-time or full-time basis with a medical institution is in a better position to establish his reputation as a private practitioner than is an individual who devotes himself to full time private practice. The audiologist can serve as a consultant for industry, hospitals, rehabilitation centers, nursing homes, educational institutions, etc. Otologists in the area in which the audiologist practices can be invited to visit the audiologist's office for a demonstration of equipment and test procedures. Seminars at which interested otologists and audiologists discuss practical aspects of the mangement of the hard of hearing patient should be encouraged.

Private Practice in Speech Pathology as One's Sole Income-producing Professional Activity. STANLEY L. BERLINSKY, *Private Practice, Washington, D. C.*—The thought of private practice in speech pathology as one's sole income-producing activity has on some occasions given people the concept of something which is odd or alien to our thinking in the fields of speech and hearing. Certainly, private practice, as such, is not an alien concept. We readily accept the idea of private practice for most physicians, dentists and lawyers. A great majority of doctors, dentists and lawyers devote most of their time to private practice with some institutional or educational work as a supplement. In contrast to this thinking, our field has tended to move in direct opposition, with the majority of us employed by institutions and educational groups with possibly some private practice as a supplement or afterthought. The feeling has been voiced by some of us in the past that private practice should be looked upon as a sideline. It should be something to do after the working day or week is completed to supplement the family income. Some people have indicated that the person who is in full-time private practice is there due to his inability to gain employment in a hospital, university or clinic setting as a result of intellectual inadequacies or lack of experience. Contrary to this thinking, we should begin to appreciate that in order to conduct an ethical, well managed and effective private practice, the person involved must be adequate to an unusually difficult and demanding task. For, this above all—he is a man who is *alone.* It is no longer possible for him to corroborate a diagnosis or discuss a treatment program with a wide and varied staff of experts in the field. It is up to him to diagnose and treat the patient. It is up to him to corroborate his own findings, in many instances, and confer with himself. It is up to him to believe in his ability to accomplish all these tasks. The private practice, itself, should also be well managed in a professional setting. The feeling of professionalism should be extremely strong in the mind of both the patient and the speech pathologist. The patient should be made to feel that he is dealing with a professional person in a strictly professional setting. The visualization of an ethical and well managed private practice should be pleasant—not strange, positive—not negative. The individual

involved in private practice in speech pathology should be a person with greater rather than fewer qualifications. He should *certainly* be a person with advanced certification who is capable of functioning independently as opposed to someone with less education, less training and less experience.

Th7—INFORMATION FOR SPONSORS.

Summary: For the benefit of those holding the Sponsor Privilege or Advanced Certification, a discussion by chairmen and members of the Committees on Standards will provide information about current certification problems, new standards proposed, and sponsors' major responsibilities. Questions and discussion from the group will be welcomed.

Th8—OUR PROFESSION AND OUR ASSOCIATION.

Where Are We Going Professionally? WILLIAM H. PERKINS, *University of Southern California*—Our profession can develop in many directions. If this growth is to be orderly, we must face some serious questions: (1) How do we prepare students at a high professional level? Do we submit them to a curriculum that is highly specialized in which they move increasingly toward development as specialists? Do we try to train them with as liberal an education as possible and hope that they will be able to develop their specialization and professional interest spontaneously out of this broad background? Must students sacrifice their liberal background in order to acquire the professional courses? A solution might be to offer training at the graduate level and accept students who have completed their liberal education at the bachelor's level. (2) What degree should our professionally trained people receive? Certainly the M.A. and the Ph.D. are not intended to be professional degrees. However, to go to any other degrees than these, or to create a new degree is, in effect, to withhold from our people trained at the advanced levels in the clinical field the status that the current degrees hold. (3) What administrative setting should Speech Pathology and Audiology have? The answer would seem to be dependent upon the direction in which we should grow as a profession. If we view ourselves primarily as teachers, then a logical administrative home would be a department of education. If we view ourselves as primarily concerned with the organic aspects of the speech handicapped and as diagnosticians, then probably we belong in a school of medicine. If we are mainly concerned with the psychological features of speech and hearing, then we should be in a department of psychology. Of course, a central focus for us is Communication, which is presumably the rationale for most of us being in a department of speech. Even as separate departments, we are located within colleges of liberal arts, schools of education, or colleges of medicine which exert their own special influence on our pattern of growth. (4) Which direction should we develop? Since we have no real discipline that is uniquely our own, it is inevitable that we will incline in the direction of one profession or another that is already firmly established. Towards which of these professions should we be growing? Should it be medicine, psychology, education, or should it be general speech? To choose any of these exclusively would probably lead to our loss of identity.

To Our New Members: Ave Et Vale. ROBERT W. WEST, *Brooklyn College*—A professional association is an extension of the family group. It is a professional family in which we can dispute and still love each other. The several members of the family compete; but, when attacked from without, they comfort one another. Some find in the professional family a parent figure; and others take joy in serving to help, lead, and interest the new members, who are our professional children. To our new members: *ave et vale.*

Th9—TRAINING SPEECH PATHOLOGISTS AND AUDIOLOGISTS TO WORK IN INTERDISCIPLINARY SITUATIONS.

Summary: As speech pathologists and audiologists undertake professional work in various situations, they encounter the need for understanding and being understood by the several professions with which they are associated. This discussion will consider the training that speech and hearing specialists need to prepare them for work in interdisciplinary situations.

Th10—ARE PUBLIC SCHOOL CLINICIANS DIFFERENT?

The Public School Clinician. WILLIAM PHILBRICK, JR., *Commonwealth of Massachusetts*—All speech and hearing clinicians share the common goal of improving the production of speech sounds and the level of speech reception skills. However, the institution, agency, or office constituting the environment in which this goal is pursued qualifies the general therapeutic approach by setting associated goals and sub-goals, arising naturally or otherwise, from the primary functions of such environment. Thus, the speech and hearing unit in an Ear, Nose, and Throat Clinic differs in entrance procedures, areas of concentration, case load, and other considerations from a clinic devoted to the speech and hearing problems of cerebral palsied children. In similar fashion, the programs at rehabilitation centers differ from those in university clinics, and both differ from the schedules and procedures of clinicians in private practice. The public school clinician is presently situated in educational environments which vary greatly from city to city and state to state. Although in many settings gross case loads, extensive travelling time, inadequate space or facilities, or other factors may tend to hamper effective work, in other areas cooperative administrators have wielded legislative regulations to establish reasonable and realistic programs. The question of responsibility for "speech improvement," the problems of obtaining homogeneous groups, the necessity of identifying children who will "mature out" of their difficulty, and other vexing items are responding bit by bit to research and investigation, thus illustrating the process nature of the public school clinician's situation. This progress, coupled with new ideas and concepts in the public school area augurs well for continued rapid growth of this dimension of our profession.

The Nonpublic School Clinician. CARL BETTS, *State University of Iowa*—This is a report of services by a speech consultant working in a setting that is primarily medical. The speech consultant is one of a team that travels about the State of Iowa, holding mobile field clinics. The personnel consist of pediatricians, orthopedists, pedodontist, psychologist, social worker, field nurse, EKG technician, physical therapist, and ophthalmologist. Some of the work is done in the Department of Pediatrics with all of the above members available, as well as the Child Development Clinic. The bulk of cases fall between three and twelve years of age. About 64% of them are male, 36% are female. Forty per cent of the cases are return or repeat examinations, while 60% are new. About 37% of the referrals are found to have a hearing loss to some degree. The largest group consists of children who have articulation problems. The next largest group consists of children with speech retardation. The speech consultant attempts to diagnose the problem and ascertain the degree of severity, then refers the patient to a source for a correction program if this is necessary and available. The parents are counselled and a letter containing findings and recommendations is sent to the referral source, in this case, the family doctor. Where necessary, examinations by other disciplines are obtained dur-

ing the clinic visit. Some opportunities for teaching in this setting are available. A graduate student in Speech Pathology and Audiology accompanies the field clinics and assists the speech and hearing consultant. A lecture is given to each senior class of medical students as they pass through the Department of Pediatrics. The student nurses are also lectured regarding speech problems of children. There is no on-going speech correction carried out by the speech and hearing consultant in this position.

Th11—THE MEDICAL CENTER SPEECH AND HEARING CLINIC AND STUDENT TRAINING PROGRAMS.

Contribution of the Medical Center to Professional Training.

Diversity of Practicum Materials for Speech Therapy in a Medical Center Speech and Hearing Clinic. HEROLD LILLYWHITE, *University of Oregon Medical School*—The speech and hearing clinic located in a medical center offers an advantage over clinics not associated with medical centers in the depth, breadth, and richness of clinical experience available for the professional training of speech and hearing clinicians. At least three principle reasons for this advantage are apparent: 1) There is unusual variety of types of problems, severity, and range in age of cases. An individual receiving his therapy training in such a clinic is likely to have opportunity to see and work with all of the many varieties of problems arising from pathological conditions such as cleft lip and palate, cerebral palsy, neurological dysfunction due to specific brain damage, auditory disorders due to many different conditions, removal of the larynx, as well as the many so-called functional disorders and psychological involvements associated with communicative disorders. The entire range of therapeutic approach, technique and skill may be demonstrated to and used by the clinician in training in such a situation. 2) There is ample opportunity for therapy to be planned and carried out in terms of a definitive, comprehensive diagnosis and in relation to treatment of the patient's other problems. Too frequently in the small clinic not related to a medical center, therapy must be done somewhat in isolation from the medical diagnosis and treatment of a patient who, more frequently than not has many problems in addition to, or primary to, the communicative disorder. In a medically based clinic a more comprehensive diagnosis is possible, and this can be related very directly to the therapy plan and program. 3) Therapy for the communicative disorder can be assisted by and closely coordinated with several other therapy services and programs. The numerous allied therapy services that a medical center has available also enrich the speech therapy training possibilities in a clinic. The many departments of a medical center offer enriched opportunities to the therapist in training. Other therapies such as physical, occupational, psychological, and medical frequently become part of the total treatment program of the child receiving speech therapy in such a center.

Diagnostic Training Opportunities. TINA E. BANGS, *Houston Speech and Hearing Center*—There is an increasing trend within Medical Centers to offer training programs in diagnostic procedures as applied to persons with communication disorders. The added benefits of such programs in conjunction with or subsequent to a nonmedical University setting appear to lie in two areas; (1) scope of population and (2) tools for evaluation. Children's neurological clinics see a large number of youngsters with brain dysfunction who need the services of our profession for the differential diagnosis of the speech and/or language problem. Psychiatric clinics ask for language evaluations of their emotionally disturbed patients. Furthermore, diagnostic procedures are required for patients referred from departments of neurology and ENT. Here the audiologist is often called upon to assist in the diagnosis of cochlear vs. retro-cochlear problems, or to determine the effects of a new drug on the auditory mechanism. The dental programs, cancer hospitals, and mental retardation clinics are further sources for the varied and often rare population. The advantage of studying a large and varied population is enhanced by the opportunity to learn more about the tools that are used for diagnostic purposes. X-ray techniques for pneumoencephalography, image intensifiers and bone growth studies can be observed by students, and electro-encephalography is standard equipment in every medical center. In fact, many of the tools that are utilized to diagnose medical problems are often the tools that aid in the differential diagnosis of communication disorders.

Interprofessional Relationships. WILLIAM G. HARDY, *Johns Hopkins Hospital Hearing and Speech Center*—There are two major aspects of interprofessional relationships which are pertinent to the general topic: (1) the use of various allied departmental facilities in the training of specialists in audiology and speech pathology, and (2) the inclusion within these other departmental specialties of lectures, demonstrations, and clinical practicum in the field of communicative disorders. Within the past thirteen years, the development of this dual relationship has involved the third and fourth year students in the Medical School and, within the residency training program of the Medical Institutions, the Departments of Otolaryngology, Pediatrics, Psychiatry, Neurology, Neuropsychology, Maternal and Child Health, and Mental Hygiene. The participation of all these specialties occurs at both the clinical and training levels with our students in audiology and speech pathology, and our own activity contributes materially to their training programs. In addition there is the "Cleft Palate Team," which comprises nine specialty-groups, including Plastic Surgery. It is our conviction that such an alignment of common and reciprocal efforts within the Medical Institutions is invaluable. It promotes a basic, shared philosophy; it makes possible clear interdepartmental communication; it greatly improves patient-management; it gives our own students experience in the depth and range of human communication and its disorders; and it instructs those in training in medical school and in the other postgraduate specialties in the details of communicative disorders in a way which could not otherwise be available to them.

Training Personnel at the Various Levels. DARREL J. MASE, *College of Health Related Services, University of Florida*—Our association has made no concerted attempt to establish the kinds of clinical and educational experiences which are desirable for students in a medical setting at the bachelor's, master's and doctorate levels. Many of our programs of training, leading to the various levels of certification, have no orientation to a medical setting or to the medical profession, or to settings in which graduates will be working. These graduates at all levels of training are placed in positions where they are expected to function as diagnosticians as well as therapists. They relate to clients of all ages and with all types of organic disorders and when their training often has not prepared them for this breadth of activity. Medicine, psychology and other disciplines with whom we work have great difficulty understanding how the varied training programs can prepare all students at all levels for all things. One of the major difficulties in providing comprehensive evaluation and treatment programs for those with speech and hearing disorders has been the relative segregation of the various specialists concerned with the health, education and welfare of our society. This segregation is most pronounced in training programs in our universities and colleges. The concept of coordinating the applied

sciences in our institutions is gaining strength. It is time for our association to take a new look a what is acceptable training for various levels of proficiency. Do we need more and more institutions for training speech and hearing personnel, or should we strive for quality and a level of training commensurate with the services to be performed? Is a different training required for the public school speech therapist than for the therapist who is to work in a medical setting with adults and children with physical and organic disorders? These and similar questions deserve our immediate attention.

Th12—VISITS TO PROGRAMS IN EUROPEAN COUNTRIES.

A Study Tour of Special Educational and Rehabilitation Facilities in Europe. WILBERT PRONOVOST, *Boston University*—In the summer of 1956, thirty special education teachers, therapists and rehabilitation workers visited fifty schools, hospitals, institutions and workshops in Great Britain, Paris, Zurich, Copenhagen, Stockholm and Oslo. The visits and associated seminar discussions were part of a six-credit summer session study tour conducted by Boston University. The study tour was one of many tours for teachers sponsored by the Boston University School of Education since 1951. Throughout the years, travel arrangements and accommodations have been arranged by both University-sponsored and commercial travel bureaus. The itinerary, however, is predetermined by the educational director of the tour, who is responsible for arranging for all school visits, lectures, and seminar discussions. Tour membership was restricted to experienced personnel in special education or rehabilitation. The thirty members represented the entire northeastern quadrant of the United States and included experienced personnel from all areas of the physically and mentally handicapped. Educationally, the tour can be considered an advanced level survey of problems in all areas of exceptionality through visits and discussions which compared American and European programs. Each tour member prepared written reports, visited approximately 25-30 institutions, and participated in seminars held daily during the last week of the tour. The group did not visit enough institutions in any one country, or enough institutions in any one aspect of special education to be able to draw any representative conclusions about special education in Europe. Most of what we saw was similar to programs in America. We saw good schools and poor schools, both in program and in physical plant. We saw superior physical plants with only adequate programs, and superior programs in poor physical plants. We were impressed, however, by the dedication of administrators, teachers, doctors and therapists to their task of helping handicapped children lead more normal and useful lives. Morale was good. Relationships with children and parents were excellent. Many of the benefits derived from this tour are intangible, but these intangibles, plus many incidental techniques and ideas for equipment, probably brought about some changes in the practices of individual tour members.

Visits to Important European Clinical Centers. SUE EARNEST, *San Diego State College*—For three months in the fall of 1956 and in the summers of 1956, 1957 and 1959 visits were made to selected speech and hearing centers, educational and clinical, in such European countries as England, Scotland, Germany, The Netherlands, Austria, Switzerland and Italy. It was also possible to attend two international speech and hearing conferences, the 1956 Conference of Logopedics and Phoniatrics in Barcelona and the 1959 conference in London. From these visits one may make certain generalizations, sketchy though they may be, in regard to (1) Suggested itinerary and choice of centers to visit; (2) The effect of the socialized state on speech and hearing programs in such countries as Great Britain; (3) Evaluation procedures observed as compared with procedures in the U.S.A.; (4) Special speech therapy techniques; (5) Residential speech and hearing centers; (6) Comparisons of general differences in emphasis at two international conferences in regard to (a) number of participants; (b) number of papers given; (c) areas of speech pathology chosen for study; and (d) academic background of participants.

Similarities and Differences in European and American Training Programs. LYNWOOD HEAVER, *National Hospital for Speech Disorders, N. Y.*—European and American standards of professional preparation, conduct, practice, and procedures are critically scrutinized from the viewpoint of basic requirements for professional competence in the treatment of the speech or voice handicapped person, especially in the setting of a hospital clinic. British undergraduate curriculae are contrasted to those offered the American student and required by the ASHA. Extensive experience in interviewing American speech graduates and post-graduates for hospital staff positions, and in observing them function in a medically directed therapeutic setting, has highlighted certain apparent assets and deficits in the present training standards of the American system. In the interest of correct diagnosis and appropriate therapeutic effort, it appears desirable that these deficits be recognized and corrected. Present graduates who contemplate private practice, public school speech correction, or hospital clinic work appear many times to be inadequately prepared to meet successfully the diagnostic and therapeutic challenges of other than routine, everyday speech and voice syndromes.

Cleft Palate Management in England. BETTY JAME MCWILLIAMS, *University of Pittsburgh*—The English study involved an evaluation of children with cleft palate through the use of speech adequacy rating scales, consonant articulation testing, pressure ratings, recordings and photographs. These children were then compared on similar measures with a group of youngsters studied at the State University of Iowa.

Results of the study indicated briefly:

1. None of the children with perfect speech had had speech therapy. All of the children with very poor speech had had speech therapy.
2. Approximately 90% of the children studied in England had adequate speech.
3. The English children on the whole had no statistical differences between pressure ratings achieved with nostrils open and nostrils closed.
4. There was a definite tendency for these children to show the same types of articulation errors as were shown by the American children, although the English children were superior.
5. Children whose repairs were accomplished by a plastic surgeon were significantly superior in speech to children whose repairs were accomplished by general surgeons.

Th13—RESEARCH IN OTHER COUNTRIES.

Important Laryngeal Research Centers in Europe. HANS VON LEDEN, *Northwestern University*, and PAUL MOORE, *Institute of Laryngology and Voice Disorders, Chicago, Ill.*—In Europe there has been persistent interest in laryngeal physiology over a period of many years. Basic research in this field is now being carried on at various medical centers in several European countries. These centers and the focus of their current investigations will be discussed.

Experimental Phonetic Research in European Centers. JOHN W. BLACK, *Ohio State University*—A resume of the principal types of research that are in progress in various European centers that treat speech production experimentally. The summary of equipment available in different laboratories and of the interests of the key personnel is intended to serve as a first approximation of a guide to American scientists who wish to match their interests abroad.

Mechanisms of Compensation for Hearing Deficiencies: Research of the Moscow Institute of Defectology. BORIS V. MORKOVIN, *University of Southern California*—Compensation for sensory handicaps in general and for hearing disorders specifically is considered by Soviet defectologists to be a form of *adaptation by an entire organism* to the new conditions—i.e., conditions created by the deficiency—of its existence. Because of the immense plasticity of the human organism and the nervous system, correct therapy and training can facilitate and channel adaptation. Such measures bring about certain changes in the Central Nervous System. The changes produced by effective training are: (1) *auditory training* produces a change in the *intra*sensory relations between the peripheral and central ends of the auditory organ (called "auditory analyzer"); (2) *multisensory training and recoordination* produces a change in *inter*sensory relations, i.e., audio-visual, tactile, kinesthetic; (3) *Motivation to communicate orally and conscious effort to cooperate in habilitation* produce a *heightened level of cortical tonus;* (4) *a living vocabulary* (called "second signal system") imbued by *direct experience* (called "first signal system") mean the necessary *conscious level* for self-habilitation is made possible; (5) the most powerful compensatory means for hearing loss is the *acquisition of language during preschool years.* This bridges the gaps in sensory information, organizes and interprets experience, and develops necessary basic mental skills for goal-oriented behavior and successful academic pursuit. In light of their conviction that early language development in hearing-impaired children is imperative, Soviet experimenters have given this problem maximum attention for the past decade. They utilize *all compensatory measures to give preschool children language and verbal thinking;* they employ *multiform* aspects of language, e.g., speech, speech reading, flashcard-reading, and some even use the dactyle method (finger spelling) *as a temporary crutch* to initiate speech.

Audiology in Israel. MOE BERGMAN, *Hunter College, New York*—The historic International Course in Audiology which was held in Stockholm in 1950 included, among its registrants, six otolaryngologists from the new State of Israel. Three years later the speaker was invited to visit the country for the purpose of planning and activating a coordinated program in audiology. At that time and on a subsequent visit, under the sponsorship of the American Operations Mission to Israel ("Point Four"), assistance was given in the development of diagnostic centers, educational and rehabilitation programs, planning for an industrial audiology program and a program of training of professional personnel. On the first visit the major effort was devoted to the establishment of a new audiology center at the Government Hospital, Tel Hashomer. When construction was completed this center's activities were divided into; 1) clinical audiology, 2) technical services, including the calibration of audiometers, noise surveys in industry, advising on ear plugs and other devices for protection against acoustic insult, advising the appropriate ministries on the technical acceptability of hearing aid models offered for import, etc., 3) the preparation of professional publications, instruction leaflets for the training of audiology personnel and public relations materials, and 4) research. This center has recently been divided into two sections, each with 15 beds in the hospital, to encourage the expansion of research activities. Two other major hospital audiology centers have been operating in Israel, one at the large Beilinson Hospital, of the Sick Fund of the General Federation of Jewish Labor in Israel, the other at the Hadassah Hebrew University Medical Center in Jerusalem. Additional centers have been planned for the Hadassah Tel Aviv Hospital and the Government Hospital (Rambam) at Haifa. For some years the staff of the Ear, Nose and Throat Department of the Hadassah Hebrew University Hospital in Jerusalem has conducted a school testing program, with threshold tests being conducted at the hospital. A demonstration school testing program was conducted at Natanya under the combined auspices of the Israeli Ministry of Health and the American Operations Mission to Israel. This program was later extended to Petah Tiqva and other communities. The educational programs for preschool and school-age deaf children in the cities of Tel Aviv, Haifa and Jerusalem have been enlarged, with increasing emphasis on the oral approach and the use of group and individual hearing aids. With the assistance of the Technion, Israel's technical institution for higher education, research is being conducted in Haifa on auditory perception. In Tel Aviv a new organization known as "Micha," the Society for Deaf Children, was formed to develop a modern oral school for the deaf in that city. In both of these cities and in Jerusalem Americans and American-trained Israelis are making substantial contributions to the newer methodologies being employed in the education of the deaf children in Israel. A key aspect of the growing activities in audiology in Israel is the training and recruitment of personnel. The medical specialists have formed discussion groups and are publishing results of clinical research, while the corps of audiologists and special educators is increasing through local efforts and through a program of training in the United States.

Th14—DISCUSSION FORUM FOR DIRECTORS OF SPEECH AND HEARING CENTERS.

Summary: Directors of five speech and hearing centers will consider problems common to those who direct such programs.

Th15—PRIVATE PRACTICE: STANDARDS AND RELATIONSHIPS.

Training and Certification Standards for the Private Practitioner. JOHN L. BOLAND, JR., *Oklahoma Speech, Hearing and Reading Center,* and JOHN S. WORTLEY, *Hudson River Speech Center, North Tarrytown, N. Y.*—Training and certification standards for private practice in speech therapy and audiology must consider the following pertinent areas: (a) Meanings of the terms "certification" and "licensing" and their implications for private practice in speech and hearing fields. (b) State level certification or licensing versus national level (ASHA) standard setting. (c) Minimum degree levels considered necessary for private practice. (d) Length of experience and types of experience most helpful to persons going into private practice. Training institutions which offer the most necessary experience might be certified. (e) Suggested changes to be made in the graduate curriculum to help prepare graduate students for private practice. (f) Suggestions for post graduate study for private practitioners. (g) Supervision and consultation possibilities for private practitioners.

An Evaluation of Relationships Between the Private Practitioner in Medicine, and the Private Practitioner in Speech Pathology and Audiology. RICHARD T. BARTON, *Beverly Hills, California*—This paper analyzes the areas of cooperation between the otologist and the audiologist, exploring the need for the private practitioner in audiology, the possible duplication of services, and the relationship with the hearing aid dealer.

A similar study is made of the speech educator, in relation to the neurologist, the laryngologist, and the pediatrician. The viewpoint is taken that audiology and speech pathology represent essential elements in medical care and are not "paramedical." However, practitioners in these areas need not possess a medical degree but should be of doctorate status to possess advanced certification.

Problems in Coping with the Poorly Qualified Private Practitioner. CARL H. RITZMAN, *University of Oklahoma*—

I. Is there a need for action?

II. If there is, what should be done?

A. What can be learned from AMA's experience in this regard?

B. What can be learned from APA's experience here?

C. What can be learned from the experiences of these groups operating through state organizations?

D. Is legislation indicated, and if so, can its general nature be specified?

1. Pending such legislation, if and when, what can be done to protect the public in the event need for such protection is established?

a. Can ASHA develop standards and enforcement policies and practices for the improvement of the professional stature of private practitioners?

b. Can ASHA sponsor publication in popular media of articles designed to broaden and deepen the public's understanding of training, and clinical and research standards in speech pathology and audiology?

c. Can ASHA enlist the cooperation of Better Business Bureaus, Chambers of Commerce and other community service organizations to make more effective this education and protection?

Pitfalls in Private Practice. MELBA HURD DUNCAN, *Colorado Springs, Colorado*—Pitfalls in private practice grow out of (1) false assumptions, (2) the existence of inescapable and very real problems, (3) inadequate information, and (4) unavoidable pressures in the following areas: qualifications; communication and relationships with people in other professions and within our profession; professional labels and affiliations; parental and patient counselling; ethical practice; economic facts; services to nonprofessional organizations; and the professionally unique necessity of encompassing both expert and creative diagnosis and clinical wisdom on the one hand and the duller aspects of rehabilitative drudgery on the other. Examples are presented to illustrate the pitfalls under the above classifications.

Th16—RELATIONSHIPS WITH OTHER FIELDS: ASHA AND OTHER PROFESSIONAL ORGANIZATIONS.

Summary: In summarizing the relationships that exist or need to be established between ASHA and other professional organizations, representatives from clinical psychology, otolaryngology, physical medicine and rehabilitation, audiology, and speech pathology will consider together their mutual interests and problems. Those invited to participate in this discussion have been asked to be frank and critical in their suggestions and recommendations.

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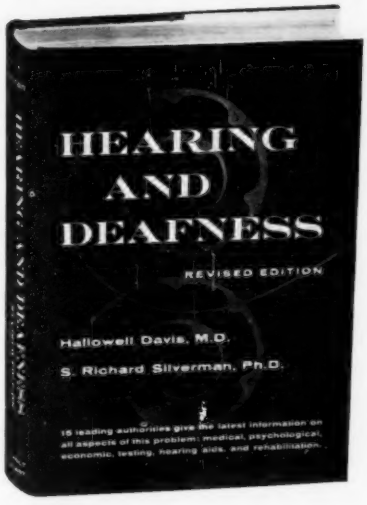
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FRIDAY, NOVEMBER 4

F1—APHASIA: THEORETICAL AND EXPERIMENTAL STUDIES.

Reduction of Vocabulary in Aphasia. HILDRED SCHUELL, *Minneapolis Hospital,* and JAMES J. JENKINS, *University of Minnesota*—A previous study by the same authors showed a general language deficit in aphasia independent of modality and of various perceptual, motor or sensorimotor defects present in some aphasic patients and not in others. The present study investigated one aspect of this general language deficit, reduction of vocabulary, as demonstrated on specially constructed tests, as follows: (1) Pointing to common objects named by the examiner. (2) Matching printed words to pictures. (3) Matching printed to spoken words. (4) Naming pictures. (5) Writing words to dictation. The test for auditory recognition required patients to discriminate the test word from words similar in sound, words similar in meaning, and from dissimilar and unrelated words. Reading tests required the same kinds of discriminations, and in addition, discrimination of words with similar visual configurations. Words for the naming test were selected from words used on the Kent-Rosanoff Word Association Test, for which popular associations of normal populations are known. Spelling words were selected from grade levels 2 to 6 on standard spelling tests. Only high frequency words were used on all tests. They were administered to nonselected series of aphasic patients seen in the Aphasia Clinic of the Neurology Service, at the Minneapolis VA Hospital. Obtained findings were as follows: (1) Reduction of vocabulary was found on all modalities tested. (2) The most frequent error was confusion of words associated in meaning, probably representing generalization in language learning. (3) As total errors for individual patients decreased, the probability of association-type errors increased. (4) Only a few patients, and in general those most impaired, confused dissimilar and unrelated words, or made random responses. (5) The frequency of perceptual-type errors, both auditory and visual, and of motor and sensorimotor errors on appropriate tests, was insignificantly higher for those patients previously classified in diagnostic groups in which a high incidence of specific error-types would be predicted. (This research was done during the tenure of a grant from The Institute of Neurological Diseases and Blindness. Some of the computational work was done by Joanne d'Andrea, as a research assistant employed by funds from the above grant.)

A Second Report on a Study of Modifications of Language and Intellect Associated with Right Cerebral Damage. JON EISENSON, *Queens College*—Continued study of the modifications resulting from right cerebral damage on language and intellect in general confirms the results of the preliminary study. The present report reflects the results of a larger number of cases, comparisons with "control" cases, and the use of a shorter test inventory. The results suggest that: (1) Right brain damaged persons show a decrement in sentence completion ability. They do least well in completing sentences calling for abstract words. They do somewhat better on multiple choice sentence completion items than in the completion of sentences requiring that they formulate and furnish their own words. (2) Right brain damaged persons show a decrement in intellectual functioning as measured quantitatively and qualitatively by their vocabulary scores. (3) In general, brain damaged persons have greater difficulty in placing themselves at the disposal of another person's language formulations than do the nonbrain damaged. In this respect, the experimental group manifests difficulty in assuming what Goldstein would refer to as the abstract attitude. (4) If the test items are considered as a measure of intellectual functioning, then the results suggest that right cerebral damaged persons show a definite decrement in verbal intelligence. This observation is not generally found in the literature. Typically, the findings on the effect of right brain damage emphasize the maintenance of verbal intelligence and the impairment of performance (presumably nonverbal) tasks. The difference between the present results and those in the literature may be a function of the type of testing involved. Although the experimental inventory was relatively simple, it nevertheless permitted of more qualitative as well as quantitative analysis than do most of the test items discussed in the literature. In essence, the results of our study indicate that persons who incur right cerebral damage express this involvement in reduced intellectual proficiency and in a decrement in language proficiency. We shall not try to indicate the direction of the causal relationships between the factors of language and of intelligence.

A Test of Aphasic Adult's Ability to Comprehend and Express Prepositions. H. HARLAN BLOOMER and MARYANNA BENDER, *University of Michigan*—As a means of identifying certain linguistic items, a test was designed to evaluate the ability of an aphasic adult to comprehend and express twenty prepositions and prepositional phrases. It was divided into 6 subtests designed to evaluate the specific language areas of: auditory comprehension, silent reading comprehension, verbal expression, written expression, oral reading and ability to formulate prepositional statements involving the correct use of these words. On a split-half test of reliability the test had a correlation of .99 which was significant at the 1% level of confidence. Sub-test 6 was not subjected to a test for reliability because of the difficulty it presented in scoring. A rank order of difficulty was assigned to each word on each of the 5 reliable sub-tests and indicated that most of the words retained their approximate rank of difficulty in all of the areas tested. In general the scale of relative difficulty in the use of prepositions according to language modality, as judged by the frequency of errors, showed the frequency order of progression from easiest to most difficult: (1) auditory comprehension, (2) oral reading (3) reading comprehension, (4) verbal expression, and (5) written expression. The latter two were markedly more difficult than the first three. The test is useful as a supplement to more comprehensive tests in an effort to understand the language restrictions of an aphasic patient more thoroughly.

Towards a Theory of the Repetitive Verbal Behavior of Aphasics. RITA TIKOFSKY, R. P. BARRETT, and R. S. TIKOFSKY, *University of Michigan*—The occurrence of repetitions or reiterations in aphasic speech is a frequently observed phenomenon. These repetition behaviors are usually noted as "perseveration." In the course of examining transcriptions of aphasic speech in response to T.A.T. cards and listening to tape recordings of aphasic speech in response to test items, it appeared to the authors that there were differences in the types of repetitive behavior exhibited which warranted investigation. The present paper is concerned with a description of some of the varieties of these behaviors and an attempt to provide a theoretical interpretation of them. There appear to be two general types of repetitions present in the speech of the aphasic. One may be called "True Perseveration," and the other we have tentatively termed "reiterative searching." These two general types of repetitive verbal behavior appear to result from two different types of activity in the nervous system of the aphasic, and perhaps from different types of damage to the system. The two types of behavior may occur in a given patient, but the conditions which evoke the behaviors seem to be different. From a theoretic standpoint it would seem that

these differences might afford valuable clues to both the diagnostician and clinician. Aside from the purely clinical implications, the concepts are also discussed in relation to our understanding of normal language behavior and to the problem of constructing machines which can stimulate language behavior, both normal and pathologic. (This research was supported by a Horace H. Rockham Faculty Research Grant.)

An Experimental Investigation of Nonverbal Learning with Adult Aphasics. RONALD S. TIKOFSKY, *University of Michigan*, and G. REYNOLDS, *University of Michigan Medical Center*—As a preliminary to the experimental investigation of verbal learning by aphasic adults it was felt that nonverbal learning should be investigated first. In order to accomplish this a modification of Grant's Wisconsin Card Sorting Task was administered to 20 nonaphasic, nonbrain damaged subjects and to 14 adult aphasic subjects. The modifications of the W.C.S.T. permitted a completely nonverbal administration of the test. A description of the changes in the original task as well as the procedures is presented. A pilot study using nonbrain damaged subjects revealed that there were no significant differences in overall performance between the modified task and the original. An analysis of variance was carried out to test the hypothesis that the learning rate for aphasics is slower than that of nonaphasic nonbrain damaged adults. The results of the statistical analysis support this hypothesis. The difference between the two groups of subjects in terms of rate of learning is significant at the .001 level of confidence. In addition, the statistical analysis pointed to significant differences in terms of the nature of the performance as well as characteristics of the task. Another analysis of variance was performed to explore differences between the two groups of subjects in terms of the types of errors made. Here too, significant differences were found. The implications of these findings in terms of their relation to learning experiments in the study of aphasia is discussed. Time required: 15-20 minutes. Slides.

F2—SPECIAL PROBLEMS IN CLINICAL AUDIOLOGY.

Auditory Perceptual Abilities in Persons with CNS Damage. RICHARD A. WINCHESTER, *Temple University Medical Center*—Clinical observation and previous research suggest that damage to the CNS may produce alterations in auditory perceptual capacities, although peripheral hearing acuity remains unchanged. A test of the ability to respond to speech in optimal and unfavorable perceiving conditions was devised and administered to 99 brain-damaged and 181 neurologically intact control S's. This instrument involved the binaural presentation of selected monosyllabic words recorded at varying intensity levels in quiet and induced masking noise. The test was designed to measure the relative effectiveness of auditory figure-ground differentiation and the ability to shift the auditory perceptual set. Frequency of occurrence of verbal perseveration was also obtained. Four test responses were defined: correct verbal responses, vowel-consonant correct errors, errors of omission and phonetically random errors. Scoring involved a comparison of mean performances in quiet to mean performances in noise. Findings were as follows: (1) No significant age or sex differences in auditory perceptual abilities were found, (2) No significant differences between control and brain-damaged S's in optimal perceiving conditions were found, (3) No significant difference between focally and diffusely brain-damaged S's were found, (4) Verbal perseveration appeared to play no part in the genesis of errors in brain-damaged S's, (5) Very significant differences in unfavorable perceiving conditions between control and brain-damaged S's were found, and (6) Very significant differences between control and brain-damaged S's in the ability to shift perceptual set were found. It was concluded that: (1) Age and sex *per se* have no influence upon effectiveness of auditory perception in unfavorable perceiving conditions, (2) Brain damage can lead to less effective auditory perception, (3) Motor and perceptual dysfunction can appear as unrelated symptoms of disordered CNS function, and (4) These findings tend to support holistic rather than specific area neurological explanations of perceptual function. (This paper is based upon a portion of a doctoral dissertation completed at the University of Southern California under the direction of Dr. Lee E. Travis.)

Testing the Hearing of Rh Athetoids: A Lesson in Clinical Sensitivity. ROBERT W. BLAKELY, *University of Oregon Medical School*—The cerebral-palsied 'deaf' child does not respond to pure-tone hearing tests nor exhibit behavioral symptoms like the 'typical deaf' child because he is not 'typically deaf.' He is brain-injured 'deaf' and responds in ways which are not characteristic of any single 'pure' disorder. The examiner of hearing in cerebral-palsied children must not carry with him the prejudices of his experience in testing the hearing of non-brain-injured children; just as the examiner of the pure-tone hearing of very young children must not expect the same responses and behavior to the hearing test as that of six, seven and eight year olds. Experience with pure-tone testing of Rh-athetoids indicates that they exhibit distractibility, response lag, perseveration and apparent rapid fatigue at pure-tone threshold. These factors, if not understood, may cause the examiner to give up his test, declaring that the patient is unable to cooperate, or it may mislead him to the supposition that the results obtained are completely inconsistent. Virtually the same problems and similar results may be encountered in the pure-tone testing of normal children between the ages of 2½ to 5 years of age. (This paper is based on experience obtained and results found in carrying out doctoral research on "Erythroblastosis and Perceptive Hearing Loss: Responses of Athetoids to Tests of Cochlear Function.")

Implications of "The Complex Case" for General Audiometric Procedures. WILLIAM WALDROP, AUDREY B. HEINEMANN, *Presbyterian-St. Luke's Hospital* and JANE C. FARLEY, ARTHUR J. DERBYSHIRE, *Illinois Institute of Technology*—With the coming-of-age of audiometry as a science, clinicians at first depended on the audiogram as the sole instrument in estimating auditory sensitivity. There was little apparent recognition that the standard audiogram measures only the terminus of a long and complex sequence of events. Such dependency seemed to assume a direct "ear-to-right-forefinger" connection without the mediation of the circuits we know exist on the sensory side, from ear to cortex, and on the motor side, from cortex to response. In late years, the literature has reflected an increasing emphasis on "the complex case," in which the amount, pattern, and etiology of the hearing loss is a matter of multiple testing and subtle reasoning. It is improbable that the entire clinical population passing through our hearing centers would change so dramatically. What is more probable is that increasing sophistication in the progression of audiology now reveals this complexity. We are approaching the concept of audiology as a complete "science of hearing," which accepts the fact that the behavior we measure contains, and is modified by, those central nervous system mechanisms which transmit, code, and decode the original stimulation. Accepting this, we are also asserting our responsibility for understanding those processes and including them in our analysis. An exploratory study of the psychic components in hearing loss illustrates the use of localizing tests in our own and other disciplines, to pinpoint the unique picture of a particular clinical hearing loss. In such a test battery, we aim, not at agreement between test findings, but at a meaningful interpretation of discrepancies among measurements. If the tests which measure function at two different

points in the auditory arc offer different estimates of hearing sensitivity, we do not assume that one of them is wrong, but that there has been some change in function in an area between the measured points. Estimates of the amount of psychogenic hearing loss, based on this kind of inter-related audiometric analysis correlate with independent psychological measures, at an average of .659.

The Free Operant in the Measurement of Hearing in Exceptional Children. LEE MEYERSON, JOHN L. MICHAEL, and J. H. MABRY, *University of Houston*—According to the research literature, mentally retarded children have an extremely high incidence of impaired hearing. Experience with mentally retarded children and knowledge of routine, pure-tone audiometric techniques led the authors to doubt that the incidence was as high as reported and to search for an automated procedure employing positive reinforcement that would facilitate the ascertainment of auditory thresholds in these and other "hard to test" children without requiring an excessive amount of time from the audiologist. A modification, which will be described, of the Blough-Bekesy technique for measuring sensory thresholds in animals proved adaptable to our requirements. With its use, it was possible to obtain measurements of hearing in mentally retarded children who were not amenable to testing by regular audiometric techniques. The method has more general utility: It offers an automatic way to train children to respond to pure tones of low intensity and to be certain they are responding as well as they are able. It offers a way of reducing some of the aspects of measurement that are aversive to some exceptional children. It can be used independently as an objective threshold-measure of hearing and other senses, and finally, it helps to distinguish hearing loss from intellectual deficit, impairment in discrimination and other nonauditory problems. (This research was supported, in part, under contract with the U.S. Office of Education.)

F3—PROBLEMS IN THERAPY WITH YOUNG STUTTERERS.

Focal Points in Diagnostic Evaluations with Young Children with Relatively Severe Speech Pathology which Suggests Play Therapy as the Therapy of Choice. JOHN S. WORTLEY, *Hudson River Speech Center*—This paper describes the diagnostic cues that have been the determinants in advising play therapy integrated with a program of psychiatric social worker counselling for the parents. This paper draws on approximately two hundred case studies which will document the approach used. The report deals primarily with the presenting dynamics that give us our cues, in addition to several illustrative case studies, and is a follow-up study of the report given at the 1959 convention regarding play therapy as a medium in treatment of a group of these children who had stuttering symptoms.

F4—EXPERIMENTAL PHONETICS I: REGIONALISM AND DEVELOPMENTAL DISTURBANCES IN PHONEMES.

Effects of selected phonetic aspects in the transmission of the Spanish language. CRUZ A. HARDIGREE, *Auburn (Alabama) University*—The objects of this research were to establish a vocabulary that might be used with some foreknowledge in appraising talkers, listeners, and communication equipment, and to discover words that might be used alongside them in the response form of a Spanish multiple-choice intelligibility test. Incidental rewards of the study were first approximations about the characteristics of the Spanish language that differentially affect intelligibility. Lists consisting of 50 test items each were developed. The tests were recorded by ten Spanish male speakers and played back through headsets in quiet and noise to 65 Spanish-American listeners. Intelligibility values of listening panels, speakers, lists, and words were compared. The contribution of each major orthographic-phonetic unit to the intelligibility of the words under the conditions of this test was appraised. Preservation-in-error values were computed for each major orthographic-phonetic unit. Substitutions for the stimulus sound units were obtained for each word. The relative intelligibility values of Spanish-American words in quiet and in noise were significantly correlated ($r = .53$). Fifty-item lists of "grave" words were, in general, adequate in length to yield similar values in intelligibility testing. Factors that appeared to affect the intelligibility of the Spanish bisyllabic "grave" words were, as first approximations, the accented syllable, the presence of four orthographic-phonetic units in a word, terminal vowels in a word, the occurrence of a vowel-consonant order in a syllable, and the presence of particular orthographic-phonetic units in a word, viz., [f], [l], [wa], [aI]. Factors that contributed to the intelligibility of the Spanish and the English language were compared: sounds that apparently deter intelligibility in English, enhance intelligibility in Spanish and vice versa. The number of sounds in the words differently affect the intelligibility in both English and Spanish languages.

Adolescent Voice Change in Southern White Males. HARRY HOLLIEN, *University of Wichita* and ELLEN MALCIK, *Rosebud and Cameron, Texas Public Schools*—The purpose of this study was to investigate adolescent voice change in southern white males and to compare the findings with those of Curry for northern white males and with those of Hollien and Malcik for southern Negro males. Three groups of six subjects each were chosen representing preadolescence (10-year-olds), adolescence (14-year-olds) and postadolescence (18-year-olds). Subjects were chosen according to criteria that included chronological age, height, weight, intelligence, speaking ability, reading comprehension and residence. Oral readings of factual prose were recorded phonographically, and standard measures of pitch variability and central tendency of fundamental frequency were obtained by means of the phonellographic technique. While the several comparisons of pitch variability revealed only minor relationships among subjects in the three studies, systematic differences were found among the measures of central tendency of fundamental frequency. These measures of pitch level were compared statistically to those obtained previously on southern Negro boys. It was found that, for all groups, the pitch levels of the southern white boys were higher than those for the corresponding Negro group. This trend was most striking at the 14-year-old level where two of the Negro boys had completed and three were in the process of voice change; whereas for the white group only one had completed voice change and, while four had apparently initiated voice change, this shift as yet was not extensive. Thus, these results suggest that there may be a racial factor operating both for habitual pitch level and the onset of voice change. On the other hand, comparison of these measures with the results obtained by Curry on northern white males show that for all groups the southern white boys exhibit lower pitch levels. This was noted especially between the 14-year-old groups where none of Curry's subjects had initiated voice change and while, as noted above, there were systematic differences between the two southern groups, actually the pitch levels of the southern white boys were closer to the Negro groups than they were to Curry's northern white boys. This would seem to suggest that there may be other variables, such as climate or time, operating and the authors are attempting to define these by replicating Curry's study on northern white boys. (This study was supported by Wichita University Faculty Research Fund Grant #01-874-4.)

Cultural Influences upon the Language Behavior of the Mesquakie Indians. J. L. STEWART, *University of Denver*—The observation that judgments and evaluations pertaining to speech and language behavior have little validity outside the culture within which they are made is clearly seen in the case of the Mesquakie Indians of Iowa. During the academic year 1957-58, all three Mesquakie males who were enrolled at the University of Iowa were referred to the speech clinic by instructors who felt that they had "voice problems," characterized primarily by a lack of volume. Study of the cultural patterns which are native to the Mesquakie reveal why such a "problem" should appear to be universal among the people. The Mesquakie child is taught at the time he learns speech that his verbal output is something to be controlled. Four mothers of school age children at the Mesquakie Settlement were questioned on this point during the spring of 1956 and all reported that children are also taught to avoid verbal aggression, particularly when speaking to elders of the tribe and strangers. This training appears to carry-over into adult life and is further encouraged by the parents teaching their children Fox prior to English and using the native language as the primary one of the household. In order to more thoroughly evaluate this observation, twenty-three Mesquakie first and second graders at the Sac and Fox Day School were recorded individually as they responded to picture cards and the speech samples obtained were analyzed. The results of this analysis indicate that the spontaneous verbal output of the children is limited in comparison with children in our own culture. Length of response, total number of responses, total number of words used, and number of unsolicited responses obtained are significantly less than those obtained from white children. An analysis of the reasons for such behavior reveals an inter-relationship existing among such factors as a submarginal economy, belief in witchcraft, and verbal output. (The study was conducted while the author was a graduate student at the University of Iowa, and was under the direction of Professors Wendell Johnson and D. B. Stout.)

F6—SPEECH AND HEARING FOREIGN STUDENTS II.

Text dictation in language learning. SHIRLEY K. SILVER and JESSE O. SAWYER, *University of California, Berkeley, California*—In this paper we describe a technique for presenting short dictations to language classes. It is a technique which, so far as we can determine, has never been used before and which our experiments indicate gives a one-semester improvement of between 30% and 50% for average students. A dictation is given on three consecutive days. During the second presentation the student has his marked, but not corrected, first effort before him. At the end of the second presentation the student is given a copy of the dictation. On the third day, the third presentation, i.e., the student is expected to produce a near-perfect copy. Discussion is limited to the appropriate linguistic considerations.

The Administration of Programs in English for Foreign Students in Colleges and Universities. VIRGIL A. ANDERSON, *Stanford Medical Center*—Courses in English for foreign students have presented certain problems of financing and administration since they were first organized a number of years ago. Some of these problems could be stated as follows: (1) What department has responsibility for offering such courses? (2) Does the choice of sponsoring department determine the content, focus, and methodology of the courses? (3) If the responsibility is split between two departments, e.g., Speech and English, what is the nature and degree of integration between the oral and written emphases? (4) How much work in English is it feasible to require or advise the foreign student to take? (5) What should be the major points of emphasis in such courses? (6) What screening procedures should be used in determining what and how much work in English the foreign student should take? Some partial answers are offered to these and similar questions related to the general problem of administering and organizing instruction in English for foreign students. Such answers will be based upon our experience here at Stanford as well as upon information which I hope to gain from an informal survey of a number of institutions throughout the country offering such work.

The Speech Problems of Foreign Students Learning English. WILLIAM F. MARQUARDT, *New York University*—This paper will attempt to survey the research that has been reported in recent years on the speech problems of learners of English as a second language. Progress on the major problems that have interested researchers will be described and apparent trends in research will be examined.

F7—CONTRIBUTED RESEARCH PAPERS IN AUDIOLOGY.

The Relation of Post-Stimulatory Auditory Fatigue to Four Aural Etiological Groups. AUBREY EPSTEIN, *State University of Iowa* and DEBORAH ROTTMAYER-BOWER, *University of Pittsburgh*—The purpose of this study was to devise a differential diagnostic tool for diagnosis among four distinct etiological groups of hearing: ten normal hearing individuals, ten otosclerotic individuals, ten presbyacusic individuals and ten acoustic trauma individuals diagnosed as such by their medical and audiologic histories. The initial temporary threshold shift exhibited from exposure to a low level fatiguing pure tone stimulus (20 db. S.L.) which was presented to the ear for a duration of three minutes at 4000, 2000, and 1000 cps, respectively, was observed as well as the recovery from the fatiguing tone. The recovery curve was recorded at the frequency under test for a duration of six and one-half minutes by standard automatic audiometry. The results indicated: (1) The response to low level pure tone stimulation at 1000, 2000, and 4000 cps differentiated between the conductive loss and normal hearing groups and between these two etiologies and the neural involvements (cochlear and retro-cochlear); (2) Differentiation between etiologies was more marked when the temporary threshold shift was computed at time intervals at least 60 seconds after stimulation and maintained these differences up to six minutes post-stimulation; (3) Initial temporary threshold shift was not a differentiating measure between the etiological groups; (4) The normal hearing and conductive loss groups exhibited a greater temporary threshold shift and a slower recovery time for the stimulated frequency than did the neural involvements; and (5) Indications for a more definitive differential diagnostic tool were proposed in which a higher level fatiguing stimulus should be utilized and recovery from the fatiguing tone observed at one-half octave above the stimulated frequency. (This paper is based upon the M.S. thesis of Deborah Rottmayer-Bower, completed under the direction of Professor Aubrey Epstein at the University of Pittsburgh in December 1959.)

Effects of Occluding the External Auditory Meatus on Bone Conducted Speech Reception Test Scores. BRUCE M. SIEGENTHALER and DORIS F. KRZYWICKI SMITH, *Pennsylvania State University*—The purpose of the present study was to test for shift in speech reception threshold and for change in articulation score upon occlusion of the external meatus. Fifteen normal hearing adults ages 22 to 29 and ten hard-of-hearing persons ages 13 to 70 were tested with ears open and with ears occluded for SRT and for intelligibility score using a bone conduction hearing aid contained in a small size sound chamber. Seven of the hard-of-hearing group had perceptive losses, and three had predominately perceptive losses with some conductive component. A statistically significant shift (increase) in acuity with occlusion was found in both groups for SRT and for intelligibility. Mean SRT improvement was 6.6 db for normals and 7.1 db for heard-of-hearing subjects. Mean improvement for intelligibility scores was 15.8 per cent for normals and 5.0 per cent for hard-of-hearing subjects. Hard-of-hearing subjects indicated their subjective impressions were that hearing was better with occlusion, using bone conduction.

The present demonstration of improved hearing with occlusion of the external meatus when using bone conduction suggests the potential for improving the hearing of patients using bone conduction hearing aids. (Master's thesis report, The Pennsylvania State University, 1958.)

Differences in difficulty among CID W-22 Auditory tests. BARRY S. ELPERN, *Veterans Administration West Side Hospital, Chicago*—At the time of the introduction of the CID W-22 Auditory Test series, a preliminary study was undertaken to detect differences in difficutly among the four main word lists. On the basis of articulation functions yielded by three groups of five normal listeners, the CID investigators concluded that the lists were essentially equal in difficulty. In view of the clinical popularity ultimately enjoyed by W-22, the present study was designed to test the assumption of equal difficulty on a larger sample, in order to provide broader evidence for or against the prevailing indiscriminate intercomparison of scores obtained by means of these tests. A pool of 1490 monaural discrimination scores was accumulated from VA audiology clinics in Chicago, New York, Washington, Los Angeles, San Francisco, and Dallas. All scores were obtained through the use of recorded W-22 lists. The test ears, which were screened to eliminate those showing a nonorganic component, distributed themselves, in random fashion, into four groups corresponding to the four main W-22 lists. Subsequent statistical analysis was performed using the percentage of discrimination loss as the basic datum. The mean discrimination loss for any group was taken to denote the average *level* of difficulty of the list to which that group was exposed; the variance was similarly taken as an index of average *range* of difficulty. Differences were found among the four W-22 lists with respect to both level and range of difficulty. From a nonstatistical standpoint, the observed differences were numerically small, and, for clinical purposes, the assumption of equal difficulty was considered tenable. Certain of these differences, however, proved statistically significant so that, for laboratory purposes, only certain pairs of lists may be assumed equal in difficulty.

F8—ESOPHAGEAL SPEECH: THERAPEUTIC CONSIDERATIONS.

Individualized Speech Therapy Approaches for Post-Laryngectomized Patients. KENNETH J. KNEPFLAR, *University of California, Los Angeles*—Therapy experience with more than 100 laryngectomees has demonstrated to this clinician that certain variations in therapy, depending upon specific prognostic factors has resulted in speech acquistion with cases whose prognoses originally appeared unfavorable. Such factors include: the extent of surgery, especially with regard to the postoperative status of the crico-pharyngeus muscle; the age; sex and intelligence of the patient; emotional stability; the emotional-social climate in the home; the time therapy is started; the patient's hearing acuity; the postoperative functioning of the articulators, the presence of foreign dialect; and accompanying breathing problems. The present paper will discuss specific speech therapy techniques which have been used successfully with laryngectomees who have presented various combinations of these problems. The emphasis will be upon those who did not respond adequately to "traditional approaches." Descriptions of compensatory solutions to complex problems in which good esophageal speech does not seem practical will be discussed. Adaptations of the so-called swallow method, injection approach and combinations thereof, as well as variations in the site of the pseudoglottis in several cases will be discussed. An awareness of the availability of a large variety of therapy techniques for use with laryngectomees and insight into their appropriate applications in different types of cases, can result in adequate communicative skills without mechanical aid for most laryngectomized patients.

Correlates of Stress Patterns in Esophageal Speech. S. MCKINLEY and R. W. WENDAHL, *Vanderbilt University School of Medicine*—A number of studies describing the acoustic properties of normal speech have been reported in the literature. Relatively few studies have dealt, however, with acoustic characteristics of speech produced by laryngectomized patients using esophageal speech. It was the purpose of the investigation: (1) to compare the types of stress patterns used by esophageal speakers with those of normal speakers; (2) to determine what likenesses or differences between the two groups exists in terms of duration and intensity; and (3) to provide some insight into the possibility of devising more adequate teaching methods. Eighteen subjects participated in the study, nine normal speakers and nine esophageal speakers who were considered to be using 'good' esophageal speech. The test list included 20 paired two-syllable words in which a shift of stress changed the function of the word from noun to verb. From recordings made of each subject, 140 pairs of words were selected for analysis. Results indicated that the esophageal speakers were using significantly longer duration in the stressed syllables although the absolute magnitude of the differences was small. With respect to intensity changes, however, esophageal speakers were found to be using this factor to a significantly lesser degree than were the normal subjects. It would appear on the basis of this information that therapeutically it may be of benefit to the laryngectomized patient learning esophageal speech to emphasize the use of duration as a means of achieving stress variance. To further validate this hypothesis, however, another study is in order comparing 'good' and 'poor' esophageal speakers in the same manner. (This paper was written in partial fulfillment of requirements for the M.S. degree in Audiology and Speech at the Vanderbilt University School of Medicine, Nashville, Tennessee.)

A Cineradiographic Study of the Pseudoglottis in Laryngectomized Patients. WILLIAM R. DIEDRICH and KARL YOUNGSTROM, *University of Kansas Medical Center*—Cineradiographic films have been made of laryngectomized patients with good and poor speech. A nine inch Phillips Intensifier using magnetic sound on film at 24 frames per second has been utilized. Lateral spot films (12″ x 14″) have also been taken. The data have been analyzed for cricopharyngeal function and two types of pseudoglottis are described. In addition, the dynamic movement patterns of the tongue, pharynx and esophague in relation to air intake are presented.

F9—CONTRIBUTED PAPERS IN AUDIOLOGY.

Success of Play Audiometry as a Function of Chronological Age. J. W. HILLIS and H. J. OYER, *Ohio State University*—If success or failure in testing children's hearing can be defined in terms of pre-established criteria, then given enough empirical data, it is possible to estimate the probability that a given child can be tested according to those criteria. Such an estimate could be made on the basis of the chronological age of the child. A set of three criteria is proposed for defining a "successful" hearing test. The criteria are: (1) the child can respond willfully to auditory stimuli. (2) Bone and air-conduction thresholds for both ears at frequencies of 500, 1000, and 2000 cps can be obtained. (3) The child's responses are consistent within 15 db on each of the frequencies tested. Unless all of these criteria are met, the test is not considered "successful." The criteria are, of course, completely arbitrary, and the meaning of the term "success" can be changed by using different criteria. Empirical data have been gathered which describe the probability of a "successful" hearing test as a continuous function of the chronological age of the child. The Gompertz function was fitted to data points for 2.5, 3.5, and 4.5 years of age. The general equation for the curve is $p=vg^{h^x}$ where p is the probability of a successful test, v is the upper limit of the probability of a successful test, g is the initial probability of a successful test, h is the rate of

growth, and x is chronological age. It was assumed that c, the upper limit of p, would be equal to unity. Then the remaining two parameters were determined with the fitting of a linear reduction by least squares. The resulting equation was $p=(.002)^{.379^x}$. For children successfully tested, there did not appear to be any significant change in test-retest reliability with respect to chronological age.

A Simplified Auditory Test for Infants and Young Children. LOUIS M. DICARLO, *Syracuse University*—In recent years a good deal of attention has been devoted to the development and refinement of techniques for differential diagnosis among children with delayed speech. The increasing research supports the hypothesis that young children with communicative disturbances are not easily diagnosed. One of the major problems has been to determine whether these children have true symbolic disabilities, whether the communicative processes have been contaminated by the failure to develop simple discriminatory behavior, or whether input auditory processes are so distorted physiologically that recognition or identification cannot be consummated. Most of these children are identified by two characteristics: (1) the inability to speak, and (2) an apparent lack of auditory sensitivity. Refinements in auditory techniques have continued, culminating in the employment of play, GSR, and EEG audiometry. The hope that GSR and EEG audiometry would unequivocally isolate these children has been questioned. GSR audiometry appears to be unsuited for hyperactive children and traumatic to others. A simple auditory test for infants and young children has been discovered in localization techniques. The child was seated in the room on the parent's lap and different sound stimuli were projected into the different azimuths in the room. Sixty infants and young children were tested in this manner and were later re-examined with play or regular audiometric techniques. Statistical analyses revealed a high relationship between localization and regular audiometry. The test required less than five minutes and the children responded to music with a great degree of accuracy. The startle responses were often elicited with the introduction of high intensity noise levels. The experiment indicates that the employment of localization techniques in testing the hearing of young children proves to be a satisfactory preliminary test for auditory sensitivity.

Intracranial Cancellation of Auditory Sensation in Cases of Unilateral Deafness. MELVIN NIDETZ and EMORY WINDREM, *VA West Side Hospital, Chicago*—In the use of the Stenger principle by pure tone audiometric technique, it was observed that certain individuals gave responses indicative of malingering on an ear which had been medically diagnosed and audiologically confirmed as being totally deaf. Ten diagnosed and known total unilateral hearing loss subjects with normal hearing in the better ear were given pure tone audiograms and were instructed to respond by keeping their hand in a raised position as long as a tone was heard. A tone was then presented at 5 db above the threshold in the better ear, and the intensity of the same tone was gradually increased in the deaf ear. The entire procedure was performed at frenquencies of 500, 1000 and 2000 cps with the earphones both in phases and 180° out of phase. It would be expected that the tone would always be audible in the better ear regardless of any signal changes in the deaf ear. This was not the case. It was observed that as the intensity of the tone was increased in the deaf ear, the subject's hand would lower. Then, as the intensity was further increased in the deaf ear, the subject's hand would again rise. The size of this interval decreased as the intensity of the tone in the good ear increased. As the sensation level of the tone in the good ear was raised, the interval was not only compressed but was also displaced correspondingly to a higher intensity level. This intracranial cancellation of the pure-tone stimuli was demonstrable on all subjects tested. An interval of intracranial cancellation of 20 db was not uncommon, and subjects have demonstrated this cancellation when a tone of 40 db and 98 db sensation level were presented to the normal and deaf ear, respectively. The phenomenon is apparently physical in nature. The presence of this cancellation does not contraindicate the use of the pure tone Stenger test, but the failure to recognize the existence of this phenomenon will often cause misinterpretation in the form of classifying as a malingerer an individual who in reality has one organically deafened ear.

A Study of Hearing in Advanced Age. C. P. GOETZINGER, G. O. PROUD, D. D. DIRKS, H. WINITZ and J. EMBREY, *University of Kansas School of Medicine, Kansas City*—A review of the literature has revealed a paucity of data concerned with the average hearing loss to be expected with advancing age for the range 60 to 90 years. Similarly, there are no published data pertaining to average auditory discrimination scores which might be expected as a function of age. Within the last few years attention of researchers has been directed toward the development of tests to differentiate cortical from inner ear and tract lesions of the auditory mechanism. Goetzinger and Rousey proposed the concept of the "Difference Score" as a possible method. The purpose of the study was therefore: first to establish tentative pure tone thresholds, speech reception thresholds using the S-2 test, and average auditory discrimination scores using the W-22 and Rush Hughes recorded tests for male and female subjects through the age ranges 60-69, 70-79 and 80-89; second, to investigate the potential of the "Difference Score" (the difference in scores between the W-22 and the Rush Hughes tests) and tone-decay in the differential diagnosis of cortical and precortical presbycusis. Ninety subjects, 15 males and 15 females at each designated age range were selected for the study. Subjects were excluded who exhibited conductive hearing losses associated with diseases of the cochlea and eighth nerve, obvious senile dementia, excessive noise exposure during the years, etc. The results to date are as follows: None of the differences between ears for the groups under study was significant at the one per cent level. The mean speech reception thresholds, irrespective of sex, were less than 15 db for the 60-69 year group, less than 20 db for the 70-79 year group and less than 30 db for the 80-89 year group. Mean discrimination scores for both sexes on the W-22 and Rush Hughes tended to decrease with increasing age. The "Difference Score" remained relatively normal (20 per cent) in the two younger groups, but increased to about 30 per cent in the 80-89 year groups. Abnormal tone-decay was absent at 500 and 1000 cps in all age groups. At 2000 cps the median tone-decay for the 80-89 year groups was 5 db. Additional results and conclusions will be presented in the paper. (Study supported by the National Institute of Health, Neurological Diseases and Blindness, Project #B-2513(A))

F10—EXPERIMENTAL PHONETICS II ALBERATION AND RECOGNITION OF PHONETIC ELEMENTS.

Recognition of Certain Consonants as a Function of Duration. JOSEPH A. MIESAE, *San Francisco State College*—Theoretical considerations supported by the work of recent investigations indicate that relative duration may be one factor used in discriminating among certain speech sounds. A tape cutting experiment was performed in which the function of duration in consonant recognition was investigated using the four fricatives [s, z, ʃ, ʒ]. Consonant duration was systematically varied by cutting away successively larger portions of the tape recorded items. Duration for each consonant was measured. In addition durations were obtained for [t-d-tʃ-dʒ]. The obtained durations for the stop-plosives and affricates were then compared with the recognition scores for each of the four fricatives when they had been cut to the corresponding obtained durations of the stop-plosives and affricates. Results obtained from listeners indicate that when cut fricatives are presented at durations approximating their own obtained durations, a high degree of correct recognition is obtained. When these same consonants are further cut to correspond in duration to that of the obtained duration for the affricates, they

are usually recognized as affricates. In a similar manner when the fricatives are cut to durations approximating the obtained duration of the stop-plosives the fricatives are usually recognized as stop-plosives. (Study performed as a portion of the research for a dissertation as partial fulfillment of the requirements for the degree of Doctor of Philosophy, directed by Dorothy Huntington at Stanford University.)

The Intelligibility of Vowels and Diphthongs in Quiet and in Noise. HENRY M. MOSER and JOHN F. MICHAEL, *The Ohio State University Research Foundation*—The purpose of this study was to determine the relative intelligibility of the common vowels and diphthongs of English in quiet and in noise. Other studies have approached this problem by means of suprathreshold levels of 50-90 db with an accompanying consonant either preceding and/or following the vowel to produce CV, VC, or CVC combinations. The present method of using isolated vowels and diphthongs has been made with the notion of possible application of a "building block" approach to the structure of a vocabulary for an International Language for Aviation based on English. Four male and four female speakers, all expertly trained, recorded randomized lists of 80 sounds containing 16 vowels and diphthongs represented 5 times. These lists were played to a panel of 6 phonetically trained listeners in equated conditions of quiet and noise at 4 db steps above detection threshold. It was found that: (1) vowels differ in intelligibility near threshold levels and the intelligibility of individual sounds does not increase at the same rate when the intensity of the signal is increased; (2) There is a general diminution of intelligibility, beginning with the low front vowels (which are most intelligible), and extending upward and backward to the high back vowels (which are least intelligibility); (3) diphthongs are intelligible according to the intelligibility of their component sounds; (4) confusion matrices show more confusion between corresponding (front-back) vowels than between adjacent (front or back) vowels; (5) male speakers are superior to female speakers in both quiet and noise conditions; and (6) the range of scores in the quiet is greater than the range of scores in noise for both male and female speakers. A more detailed discussion of speaker and listener variability, instrumentation, equating of quiet and noise conditions, and the order of intelligibility of the vowels and diphthongs is included. (The Research was supported by U. S. Air Force Contract No. A F 19 (604)-6179.)

The Modification of Speech Sounds by Alteration of the Auditory Air-borne Feedback. GENE ENGLAND, *Northwestern University*—This study was designed to investigate a clinical phenomenon observed among functional articulatory defectives. This phenomenon was that certain individuals modified their misarticulated phoneme productions as a result of introducing to their ears the correctly articulated phoneme at masking intensity. Twenty-five subjects, five in each of the ages nine through thirteen years, were selected at random. They were required to have normal speech and hearing and to have had no prior speech correction. Normal speaking subjects were selected since earlier related research had indicated that a fundamental process was involved. They were asked to maintain productions of two different phonemes for periods of six seconds each while monitoring their voices at constant levels of intensity. Judgments were made of tape recordings of the speech sounds the subjects were asked to produce while other sounds were introduced to their ears at masking intensity. The superimposed sounds consisted of sawtooth noise and other phonemes. These sounds and the subject's own speech sounds were presented binaurally, monaurally, and alternate-monaurally. Gradual amplification or attenuation in each ear was possible and permitted masking of the air-borne auditory feedback. The data indicated that the superimposition of certain phonemes was significantly more effective in modifying other similar phoneme productions than was the introduction of noise. The modifications were nearly always in the direction of the phoneme superimposed. There were no significant differences in effect noted among the three methods of feedback alteration or among subjects relative to age or sex. There was marked variability among subjects as to frequency of phoneme modifications. On the basis of the data of this exploratory study with the normal speaking population, the writer concluded that certain speech sounds can be modified by superimposing certain other similar phonemes. (This paper was adapted from a dissertation and supported in part by a research grant from the Office of Vocational Rehabilitation.)

The Relationships Between Certain Measures of Selected Auditory Abilities and Judgments of Articulation Proficiency. CLYDE L. STITT, *San Francisco State College*—The purpose of this study was to design a battery of group tests of auditory abilities appropriate for adult subjects, and to explore the relationships between these abilities and articulation proficiency. Judgments of articulation proficiency were made by four judges from recorded speech samples of 66 native born adults who had no hearing loss and no known organic or neurological impairment. All subjects were enrolled in remedial speech courses at the college level. A battery of eight tests of auditory abilities was administered to the subjects, and entrance scores on college aptitude, verbal ability, reading, vocabulary, and spelling were obtained for 55 of the subjects on whom these data were available. Four group tests designed for this investigation consisted of: a paper and pencil test, which presumably called for discriminations among internally structured signals; two auditory discrimination tests, involving intra-phonemic consonant discriminations and plosive discriminations; and a memory test for alphabet letter names. Other tests in the battery included the Seashore measures of Pitch, Tonal Memory, and Rhythm, and an individually administered memory test for vowel sounds. Intercorrelations were obtained among the various measures and correlations with articulation proficiency were determined. The results indicate that articulation was significantly related to the four measures of discrimination, to three measures of auditory memory, and to each of the entrance measures. Significant relationships were found between articulation and discrimination when each of three measures of memory was held constant through partial correlation technique. Two of the new discrimination tests were highly reliable and both were significantly related to articulation even when each of the entrance measures was held constant. Multiple correlations were calculated to determine the relative effectiveness of each test as a predictor of articulation. The paper and pencil test is considered the major contribution of this study. (Ph.D. research at Stanford University, Directed by Dr. Dorothy Huntington)

F11—NONORGANIC HEARING LOSS.

Functional Hearing Impairment as Seen in a General Hospital Audiology Clinic. RICHARD VIEHWEG, *University of California, San Francisco Medical Center*—Seventy-five successive patients with functional hearing impairment seen over a five year period at the Audiology and Speech Clinic, University of California San Francisco Medical Center, are reviewed. Referred from a variety of medical specialities, they represent 1.3% of the total patient population seen for hearing evaluation during this period of time. The symptoms range in severity from inappropriately termed "simple" problems of inattention, to instances of autistic behavior in children and adult hysteria. The paper proposes that the functional auditory problem is inevitably only one symptom of underlying difficulties or disturbances of variable degrees. Careful observation reveals manifestations in other areas of function. The paper discusses in detail significant school, social, vocational, and psychological problems, and the variety of other somatic complaints without demonstrable organic basis commonly found among the population. It is apparent that while all patients were free of current otological symptoms, a majority had a previous history of ear disease, or trauma which presented an available symptom for functional conversion. While functional

hearing problems are described at all age levels, attention is directed to periods in which their appearance is most prominent, notably late infancy, adolescence, and at the climacteric stage, when difficult human adjustments or readjustments are demanded. Detailed attention is given to the major audiometric patterns that present themselves, and to the type and size of the inconsistencies in inter-test relationships that result in their detection as functional. The relative merits of various tests in defining the auditory thresholds, as well as the frequency with which they are utilized, are discussed. Special attention is paid to cases involving a medico-legal claim.

Threshold Relationships in Simulated Hearing Loss. LYMAN S. BARRETT, *VA Hospital, San Francisco*—This investigation was concerned with threshold relationships in feigned hearing loss. The questions studied were: (1) How much hearing loss do normal hearing persons present when simulating a loss? (2) Do normal hearing persons simulate the same amount of hearing loss for pure tones and spondaic words? (3) Is the response variability in threshold tests of simulated hearing loss significantly different from that obtained in threshold tests of actual auditory sensitivity? (4) Is there any typical configuration to pure-tone threshold losses simulated by normal hearing persons? Fifty normal hearing adults having no technical experience with audiometry were asked to stimulate hearing losses in one ear. As additional inducement, monetary prizes were given the three most effectively presenting a loss. The test battery for each subject included (1) an examination of his actual auditory sensitivity, (2) and examination of his simulated loss, (3) a repeat examination of his simulated loss, and (4) a repeat examination of his actual auditory sensitivity. Each examination included a pure-tone air-conduction and a speech reception threshold test. The examinations were conducted with a carefully calibrated audiometer, using clearly specified clinical techniques. Examiner bias during the collection of data was controlled by including a specially designed auxiliary attenuator in the test circuit. Answers to the above questions have been derived by careful analyses including the use of appropriate statistical procedures. Approximately 80 per cent of the subjects presented simulated threshold results with one or more relationships sufficiently aberrant as to indicate that their hearing losses had been simulated. The findings of this investigation indicate that inspection of the relationships among respective pure-tone air-conduction and speech reception thresholds provides an effective means for detecting simulated hearing loss. (This research was presented in partial fulfillment of the Ph.D. degree requirements at Stanford University under the advisement of the following committee: Hayes A. Newby, Richard F. Dixon and Albert Bandura.)

A Study of the Relationship Between Speech Reception and Pure Tone Scores in Nonorganic Hearing Loss. JOSEPHINE M. WALKER and R. E. SHUTTS, *Walter Reed General Hospital*—Previous studies have established that normally there is a close correlation between speech reception and pure tone thresholds. An unacceptable variance between the scores of the two types of hearing tests is a much used criteria for determining unreliability of a test series. Routine inspection of large numbers of inconsistent tests seems to indicate wide variances between speech reception thresholds and pure tone thresholds. Moreover, there appears to be a definite tendency for speech reception scores to be decidedly better than pure tone averages in a large number of such cases. For purposes of investigating this trend, a study was made of test scores obtained on 183 patients whose audiometric tests were rated as inconsistent and unreliable. Comparisions were made between speech reception and pure tone threshold scores on these inconsistent tests. Results of this study revealed that in 53.5 per cent of the cases studied, speech reception scores were better than pure tone averages by more than 10 db. In more than half of these cases the difference was more than 20 db. In only 8.5 per cent of the cases were speech reception scores poorer than pure tones by more than 10 db. A similar analysis of 100 consistent, reliable tests was also made. Scores for this control group revealed that in only 6.5 per cent of the cases were speech reception thresholds better than pure tone averages by more than 10 db. In no case was the difference greater than 18 db, and in no cases were speech reception thresholds poorer than pure tone averages by more than 10 db. In the consistent test group, 93.5 per cent had speech and pure tone scores within 10 db of each other as opposed to only 38 per cent in the inconsistent test group. The high incidence of better speech than pure tone scores in the inconsistent test group suggests that this may be considered as a reliable characteristic of test performance in cases of nonorganic hearing loss.

Delayed Sidetone Audiometry. LINDA M. MCGRANAHAN, G. DONALD CAUSEY, and GERALD A. STUDEBAKER, *VA, Washington, D. C.*—Investigations have shown that with the Speech Time Analyzer, the effects of delayed sidetone may be measured with greater reliability and sensitivity than was previously possible. Plus time scores (the amount of time the intensity of a speaker's voice exceeds an arbitrary level), as measured by the Speech Time Analyzer, enable one to judge a positive response to delayed sidetone with greater accuracy than with other criteria. However, the test will not attain maximum usefulness until the clinician can predict the organic hearing threshold, given the lowest level at which a positive response occurs. The principle purpose of this study is to establish confidence limits which can be used in such a prediction. Fifty randomly selected hard of hearing subjects were used in this investigation. Each subject read a test passage five times without delayed sidetone in order to reduce the effects of fluency adaptation and to provide a reference plus time score. The subject then experienced progressively higher sensation levels of sidetone for each successive reading of the passage. Plus time was recorded for all readings and analyzed to determine: (1) graphic and statistical descriptions of the distribution of plus time scores, (2) distribution of sensation levels at which a significant response (an increase in plus time of 3.5 sec. over the reference) to delayed sidetone occurred, and (3) the measures of central tendency and dispersion which are used to establish the probabilities associated with a prediction that the organic hearing loss will fall between the 95% confidence limits. Application of the findings of this study will result in a refinement of the delayed sidetone test which makes possible its use as a predictor of the organic threshold of hearing rather than as a mere indicator of nonorganic hearing loss. (Results not available at the time of editing of abstracts.)

F12—PSYCHODYNAMIC CONCEPTS IN SPEECH PATHOLOGY.

A Re-analysis of the Psychoanalytic Concept of Ego with Regard to Speech Behavior. EDMUND C. NUTTALL, *Cornell University*—Anyone who seriously studies the psychology of speech eventually investigates the psychoanalytic theory of personality structure (id, ego, and superego). He discovers that, despite the contributions of psychoanalysts to the understanding of human behavior, they do not provide adequate answers to many questions regarding speech. The reasons for the psychoanalysts' shortcomings in explaining speech behavior are: that speech is a function of the ego, but the business of the analyst is not with normal ego activities; and that those who are studied by the analyst communicate with him by verbal free association, a type of speech having little in common with normal speech behavior. The deficiencies in the application of psychoanalytic theory to speech will have to be filled by those who are well informed about both subjects and who have opportunities to relate the feelings and motives of individuals to their speech. With proper backgrounds, those who practice nonanalytic psychotherapy or psychotherapeutically oriented speech correction have excellent opportunities to develop a comprehensive theory of speech behavior. Clinical observations in psychotherapy indicate a need to expand and modify the

psychoanalytic concept of "anxiety" and a need to redefine "homeostasis" as applied to the ego. When "anxiety" is viewed as a "fear of losing contact with reality" and "ego homoestasis" as a "process of equating internal feelings with perceptions in the environment" then many of the more subtle purposes of behavior become apparent. Fortunately, hypotheses derived from these observations are more amenable to experimental testing than are many which are drawn from psychoanalytic theory.

F13—COMMUNICATION PROBLEMS IN GERIATRICS.

Report on the Proceedings of the Annual Meeting of the International Association of Gerontology, August 1960, San Francisco. ATWOOD HUDSON, *Rockford College, Rockford, Illinois*—This discussion is concerned with the implications for the management of communication problems of the aging in the speech correction profession. Recommendations will be made to members of the ASHA regarding the importance of establishing a closer liaison with other agencies actively participating in programs designed to meet the needs of the aging population.

Problems Associated with the Development of Pseudovoice in the Aged Laryngectomee. ROBERT HARRINGTON, *Hollywood, California*—The majority of post-laryngectomy patients are of some geriatric interest. This paper, however, is to be concerned with special problems associated with the development of pseudovoice in the aged laryngectomee, whose numbers appear to be increasing, consistent with our aging population. The incidence of older laryngectomees also appears to be increasing in relation to the total laryngectomee population, presumably because of refinements in the detection of malignancy, of increased emphasis on educational programs, frequent examination, and of improved postoperative care. The aged laryngectomee presents unusual and particularly difficult problems which encompass both physical and psychological areas. Because he is slower to recuperate, he is slower coming to voice training. This allows a greater period of silence, during which time poor habits of communication may be developed. The older person has weaker muscles, is quicker to fatigue. He is likely to become discouraged because the voice remains weak, and he may use it for only short periods of time. Because of the possibility that either he or his spouse may have reduced hearing acuity, he may be less successful in monitoring his own voice, and less successful in being heard by those in his immediate family. The older person may have masticatory problems associated with denture problems. This may require a soft diet, which in turn will fail to stimulate sufficient pharyngeal and esophageal activity necessary to the development of a satisfactory pseudovoice. Other problems include insufficient economic and social need to talk. Emphasis should be placed on the need for voice training as early as is consistent with general health, stimulating masticatory action, and arranging for social contacts designed to stimulate desire to communicate. In some cases, because of the multiplicity of problems, an instrument would seem to be the method of choice for pseudovoice.

Communication and Purpose—Ingredients for Longevity. HALBERT L. DUNN, *U. S. Public Health Service, Washington, D. C.*—To feel needed and useful is a deep emotion experienced by all persons. As one grows older, this need increases in intensity until it becomes a hunger which must be satisfied or the fabric of the body, mind, and spirit as an organized whole breaks down. In addition to this emotion, the older person feels a strong desire to pass on his knowledge, experience, and wisdom to others—to his children, his friends and his fellow man. The fulfillment of this desire brings profound personal satisfaction and a feeling that his own life has been worth while and that he has added his bit to the common good. Communication and purpose, therefore, become increasingly important with the passing years. Since each of us lives in both an outer and an inner world, access to information and open channels of communication are essential to resolve the daily problems of living; this is true both for society and in the communication pathways within the body and the mind. High-level wellness for man and society requires harmonizing, through a continuum of reintegration, our understanding of self and of others. Neuroses set in unless such harmony can be achieved and maintained as a dynamic equilibrium. The individual is an enormous, organized mass of cells. This cellular entity is a topological structure which grows, suffers attrition, and eventually dissolves, as an organized whole, at death. Youth is marked by elasticity and resilience; old age, by rigidity and fragility. Longevity, type II, is defined, therefore, as the added years of life of the individual when his inner world is strengthened by open pathways of communication, purpose, effective living, and self-fulfillment.

Speech and Language Evaluation of Patients at Edgemoor Geriatric Hospital Diagnosed as Seniles Compared to Speech and Language Evaluation of Normal Persons of Comparable Age Residing in Metropolitan San Diego. OSCAR J. KAPLAN and SUE EARNEST, *San Diego State College*—This is part of a study in which the National Institute of Mental Health has granted $38,000 for the construction of a psychological abilities scale for geriatric psychotics and for related studies. Student clinicians at San Diego State College and members of the staff of Edgemoor Geriatric Hospital are participating in behavior studies of the patients on the wards. Medical and social histories of the patients are available. Additional information includes urinalyses, studies of circulating blood counts, blood urea, nitrogen, electrolyte studies, liver function tests, electrocardiograms, electroencephalograms, etc. It is planned that this study will do detailed analysis of 100 seniles (50 men and 50 women) compared to 100 normals (50 men and 50 women) of comparable age, in which speech and language evaluation will be but a part.

F14—STUDIES IN APHASIA.

Some Possible Relations Between EEG Abnormalities and Performance on Tests for Aphasia. RONALD S. TIKOFSKY, *The University of Michigan*, and KENNETH A. KOOI, *Ann Arbor*—The present study is an attempt to explore the relations between EEG abnormalities and performance on tests for aphasia. The experimental population was composed of 38 aphasic and 14 nonaphasic brain damaged subjects. Each of the subjects was given an Ammons Full Range Picture Vocabulary Test, Form A Halstead-Wepman Aphasia Screening Test, the Eisenson Examining for Aphasia Test, and an EEG. The procedure for scoring these tests is described. The subjects were subsequently grouped in terms of whether there was EEG abnormality present for each of the electrodes used. Thus, for each electrode there were two independent samples of subjects for the aphasic and nonaphasic groups, those having no EEG abnormality and those demonstrating EEG abnormality. The scores for each subject on each of the sub-tests (39 in all) were recorded for each electrode. The Whitney-Mann U test was then performed to see if there were significant differences between the non-EEG abnormality and the EEG abnormality groups for each electrode and each subtest. These statistical procedures were carried out for the aphasic and nonaphasic groups separately. The results of the statistical analysis are discussed in terms of the differences between the two groups of subjects and the implications of the findings for a theory of cerebral localization. The results of the statistical analyses appear to indicate that impaired performance in certain test variables is related to the presence of EEG abnormality in particular leads for the aphasic subjects. However this did not appear to be the case for the nonaphasic population.

Time-Tense Utterances of Aphasic Persons. EUGENE L. WALLE, *University of Michigan*—Wepman contends that "word naming" (class 1 words) followed by "verb forms" (class 2

words) are essentials to the aphasic's language recovery. Dr. Charles Fries has found that class 1 and 2 words comprised 39 per cent and 25 per cent, respectively, of a thousand word conversation employing a thousand different words in his study of "form classes" with normal speakers. The purpose of this study was to determine time-tense utterances most peculiar to aphasic persons with a continuum in speech and language training. The materials used for the study consisted of twenty hours of verbatim stenographic recordings of eighteen aphasics during formal and informal therapy periods and social settings. Studies have revealed that it is possible to group utterances to some tolerable definite time frame as expressively indicated or clearly implied by the context or situation. Utterances of eighteen aphasic persons were grouped according to general past, general present, and general future expressions. Additional time-frame analysis consisted of aphasic usage of class 1 words in time-frame utterances and agreement of subject and verb in person and number. The following conclusions were drawn from analysis: (1) the aphasics were most proficient in the general present time frame; (2) Aphasics who were able to use utterances in the general present were also able to convey semblance of preterit and future time whereas the majority of aphasics, regardless of speech and language training, were restricted to present time expression; (3) Of the total number of time-frame expressions, a significant number of utterances did not contain class 1 words. This lack of ability did not appear to be related to amount of speech and language training; and (4) the frequency of class 1 and 2 words not agreeing in person and number was insignificant. (This study was done at the University of Michigan Speech Clinic in cooperation with Dr. Charles Fries.)

A Language Ability Scale for Adult Aphasics. C. K. HARADA, *Aphasia Clinic, Long Beach VA Hospital*—This study was designed: (1) To construct a scale that encompassed a realistic range of simple language abilities for male adult aphasics: oral naming, oral reading, reading recognition, writing from copy and from dictation, formulation of oral and written expression, oral arithmetic, written arithmetic, and understanding spoken language; and (2) To compare ratings with test scores. The scale was administered individually to thirty aphasic subjects. Two independent expert clinicians rated each subject againt every other subject and their combined ratings were ranked. The thirty subjects were then ranked according to raw test scores. The data were treated with the Method of Rank Differences (rho correlation). Results showed that the validity coefficient for combined ratings versus test scores were plus 0.92. Validity coefficients for ten subtests were all above 0.80 except one. The over all inter-rater reliability coefficient was plus 0.92. Inter-rater reliability coefficients for ten subareas rated were above plus 0.80. The following conclusions seem warranted: (1) A highly positive overall validity coefficient has been found for the scale. (2) The scale is usable as a valuable clinical adjunct to various aphasia screening tests for the placement of aphasics in language retraining situations of an elementary level or lower, and (3) For patients who are transferred or referred to another clinic or therapist who has a working knowledge of this scale, a language profile with numerical equivalents based on the test scores could be easily interpreted. (This research was done under direction of Dr. Victor Garwood in partial fulfillment of requirements for the M.A. degree.)

A Rationale for Group Therapy. LOIS MASKET BLOOM, *New York University Medical Center*—It is the purpose of this paper to advance a rationale for adult group aphasia therapy which considers the learning of language as most significant and appropriate when occurring as part of a dynamic functional situation, with vocabulary chosen on the basis of patient's immediate needs in speech situations rather than according to levels of abstraction, grammatical parts of speech, or frequency of occurrence in English Language. This rationale is based on the premise that it is possible to reduce language to situational units which are meaningful in everyday speech situations and which can be recreated and structured in group therapy sessions. Selected situational language units seem to occur more frequently in the patient's daily experiences and are, therefore, more concrete and subject to easier recall and retention. In low level groups, this includes yes-no responses, Help, Fine, Bye, and progresses to descriptions of the weather, telling time, learning to indicate floors to the elevator operator, etc. In groups where patients are on a high level of language functioning, current events, the stock market, etc. provide stimuli for more complex situational units involving propositional speech. This rationale for group treatment has been used at the Institute of Physical Medicine and Rehabilitation of the New York University Medical Center with aphasic patients at all levels of functioning. However, results have been most startling with those patients diagnosed at the time of evaluation as "global," with virtually total deficits in all language areas. After minimal or no observable progress in individual therapy, these patients were able to achieve significant progress with functional carry-over after inclusion in the group program. The most appreciable gains were made in areas of auditory reception. It was observed that patients were able to learn to discriminate and understand auditory stimuli presented in a situational context more easily than auditory stimuli presented in isolated word or sentence units. Repeated participation in structured speech situations increased social effectiveness and patients have been able to learn and use appropriate oral language. The dynamic effect of the group program described in this paper has been the carry-over of clinical performance to each individual's everyday communication ability.

F15—VOICE AND VOICE DISORDERS III: SPECIAL TECHNIQUES IN LARYNGEAL RESEARCH.

A New Transistorized Artificial Larynx. HAROLD L. BARNEY, *Bell Telephone Laboratories, Inc., Murray Hill, New Jersey*—A new artificial larynx, which makes use of transistors and miniaturized components to provide a substitute voice in cases where the vocal cords are paralyzed or have been removed by surgery, is described. It operates by introducing a complex tone into the pharyngeal cavity of the vocal tract by means of an external vibrating driver held against the throat. The acoustic principles of normal and artificial speech production that were followed in arriving at the new design are presented, along with descriptions of the circuit and its operating characteristics.

Maintenance of the Pharyngeal Airway. R. L. SHELTON, JR., and JAMES F. BOSMA, *University of Utah*—This study was undertaken to examine the hypothesis that in normal subjects patency of the pharyngeal airway is maintained by a pharyngeal mechanism which includes the palate, pharyngeal portion of the tongue, and dorsal and lateral walls of the pharynx and/or by an extrapharyngeal mechanism which includes the generally distributed postural musculature of the cranium, face and neck. Each mechanism appears to function in conjunction with the hyoid suspensory apparatus. Procedures of roentgen observation were utilized to demonstrate the effect of these mechanisms of pharyngeal airway regulation during simple maneuvers. This procedure was expected to be useful in evaluating the quality of motor response in the structures of the ventral pharyngeal wall. These structures are known to be activated in feeding performance and also in the respiration-derived actions of speech. Identification of the function of these mechanisms might provide new criteria for evaluation of impairment of the pharynx by anomaly or neurologic disorder. The pharyngeal airway is described in cervical flexion, cervical extension, mouth open widely, intrathoracic pressure increase, and certain other activities. The performance of extension was especially remarkable because of the consistency of postural and pharyngeal response to spoken command. The pharyngeal

airway of each subject was distinctively expanded. The same position is assumed in dyspnea, distress, shout, and cry. This coincidence would suggest that this maneuver elicits a portion of the stress reaction which would seem to involve increase in respiratory requirements. This maneuver has potential utility as an evaluation tool because it is readily elicited in a variety of subjects of different ages and neurological capacities. The greatest variety of pharyngeal structure position and of cervical posture occurred in association with occlusion of the larynx. The laryngeal action of partial occulsion in normal speech is considered as a mechanism that facilitates assumption of more varied positions by the pharyngeal portion of the tongue and by the palate. Consideration is given to the apparent parallel in pharyngeal and laryngeal function in respiration.

Therapeutic Rationale for Vocal Nodules and Contact Ulcers of the Larynx. IRWIN LEHRHOFF, *Beverly Hills, California*—Voice disorders in both children and adults are becoming more frequent in our culture of today. Yet the literature offers little knowledge in the way of theoretical framework and even less information for a rationale of voice therapy. Fast action photography of 5000 to 8000 frames per second was utilized to evaluate varied therapeutic techniques for the two voice disorders of vocal nodules and contact ulcers of the larynx. Vocal nodules or singers, nodes form on the outer edge of the cords and cause severe dysphonia which is the direct outcome of vocal abuse and the individual's method of forcing the voice. Vocal nodules can be regarded as an advanced stage in vocal strain. In the early stages the nodules may consist of thickening of the stratified squamous epithelium of the cord which is the natural outcome of excessive friction. Irritation may also give rise to varying degrees of swelling and edema. The usual site of the nodes is in the region of the cords most active in the production of the higher notes, approximately in the middle of the anterior two-thirds of the cords where the mechanical strain is greatest. The degree of dysphonia and hoarseness varies in accordance with the size of the nodules and the degree of approximation possible for the cords. Vocal abuse is also considered to be the chief cause of the contact ulcer. The specific behavior producing the lesion is the striking of the vocal processes of the arytenoid cartilages against each other during adduction. The vigorous contact between the arytenoids is generally associated with a low pitched, guttural, low intensity, throaty voice. The force which the arytenoids strike each other causes inflammation, and eventually ulceration and granuloma or neoplasm on the mucous membrane covering the arytenoid region of the cord. Therapeutic techniques of vocal rest, breathy approach, staccato speech, pitch changes, reduction of tension, correction of breathing patterns, relaxation, and psychological factors are evaluated and discussed in relation to results shown by use of high speed cinematography in conjuction with voice therapy.

F16—SPEECH IMPROVEMENT IN THE PUBLIC SCHOOLS.

A Plan for Implementing a Speech Improvement Program in Public Schools. ELLEN M. DRAKE, *The Bill Wilkerson Hearing and Speech Center, Nashville*—The public school speech and hearing therapists are constantly faced with the problem of heavy case loads and the lack of adequate time to work with the more severe, difficult, and time consuming cases. Administrators are faced with increasing pressure for additional help for the children with speech and hearing problems. Some areas now are training the regular classroom teacher in ways of doing speech improvement as a means of supplementing the speech therapy program. An outline is presented which briefly considers the areas covered in three years of teaching speech improvement techniques for classroom teachers. These areas are: ASHA philosophy; the role of the teacher in the speech therapy program; methods for stressing speech improvement in the teaching of specific subject matter, and phonics and phonetics. Also presented are a few speech improvement materials developed by the teacher and therapist for use in the classroom. Observations of children who have had a speech improvement program indicate that classroom teachers who have had special training can supplement the speech therapy program and can, with the assistance of the therapist, materially lighten the case load of mild articulation problems for the speech therapist.

The Effects of Various Durations of Speech Improvement on Articulation and Reading. RONALD K. SOMMERS, FLORENCE G. COPETAS, ANN K. FENTON, GEORGE R. RICHTER, DOLORES C. BOWSER, FRANK B. RHODES and ZANE G. SAUNDERS, *Armstrong County, Pennsylvania Schools*—This study is the second section of a two-year-project, the first part of which was presented at the ASHA Cleveland Convention. The problem under investigation was to determine the effectiveness of speech improvement in improving articulation and reading scores when various durations of this treatment were provided to groups of children in the first and second grades. An additional problem under investigation concerned the effectiveness of speech improvement in the correction of certain types of articulatory errors. Forty-one first grade classrooms received sixteen weeks of speech improvement by speech therapists for periods of 30 minutes weekly. Procedures used in speech improvement followed those administered to subjects in the first year of the study. Thirty-five classes of second grade children who had received nine months of weekly speech improvement as subjects in the first year of the study received eight weeks of speech improvement at the beginning of the school year and four weeks of speech improvement near the end of the school year. Ten classes of children served as controls and did not receive speech improvement. Procedures used in speech improvement with second graders followed closely those which were used with first grade subjects during the prior year and were comparable to those administered to first grade subjects during the same period. Pre- and post-therapy articulation tests were administered to all subjects by a staff of speech therapists. Continuous training sessions were held to increase the intra-mean agreement of the testers. Repeated measurements of the reliability of this testing indicated that the percentage of mean agreement for the judgment of correctly or incorrectly articulated was 92.8%. Subjects were randomly sampled for each experimental group for testing by the Primary Reading Profiles Reading Test. Difference scores were tabulated for each subject. Two-part analysis of variance procedures and other parametric statistical techniques were used to determine significant differences in Pre- and Post-therapy articulation and reading scores for: (a) Subjects who received nine months of speech improvement (first year of the study), (b) control group subjects who did not receive speech improvement, (c) first grade subjects who received sixteen weeks of speech improvement, and (d) second grade subjects who received a period of eight weeks of speech improvement and a later period of four additional weeks. The types of articulatory errors amenable to correction by speech improvement were tallied and compared for first and second grade subjects. (Results not available at time of publication of abstracts.)

Results of a Speech Improvement Program for Kindergarten and First Grade Children. MARGARET C. BYRNE, *University of Kansas*—In order to determine the effects of a specific speech improvement program on the articulation, auditory discrimination, reading and spelling skills of children,

a three-year longitudinal study has been initiated. A daily speech improvement program was developed for presentation to classes of children by their teachers for twenty-one weeks. A total of 56 classes, selected at random within high, medium, and low socio-economic levels, with an enrollment of 1188 children, participated either as experimental or control sections. The syllabus was prepared by the author, who also carried out the in-service training program for the teachers. During the first week the development of adequate listening patterns and identification of the speech mechanism was stressed. The remaining lessons were built around the thirteen sounds which Templin determined were the last to be mastered by children. The Van Riper sequence of ear training was followed, with a minimum of one day devoted to each of the following steps for each sound: identification of the sound, listening for it, discrimination between the sound and those sounds with which children tend to confuse it, production of the new sound, and carry-over in key phrases. Lindquist's treatment-by-subjects design was utilized to determine the effect of the program on articulation, auditory discrimination and reading, based on scores available at the end of the first year. The *F*-ratios indicate that the experimental kindergartens achieved scores on two of the three articulation measures and the one auditory discrimination test that were significantly different from the control group. The experimental first grades had scores on one articulation test that differentiated them from the control groups. On word recognition, one of three tests in the Reading Achievement Battery, the experimental first grades performed significantly better than the controls. Evaluation of these results must take into account the variables of socio-economic level, sex, I.Q., and C.A. (This project is supported by a research grant from the U. S. Office of Education.)

A Comparison of a Speech Improvement Program and a Speech Correction Program for First Grade Pupils with Respect to Functional Articulation, Auditory Discrimination and Enunciation in Spontaneous Speech. EVELYN Y. ALLEN, *Public Schools, Kansas City, Missouri*—This research study in speech improvement in first grades is being conducted in eighteen of the Kansas City, Missouri Public Schools during the school year 1959-60. The purpose of the study is to determine whether children at this grade level with functional articulation problems improve their speech as adequately when participating in a speech improvement program as when receiving regular speech correction. 18 Experimental and control groups have been established. Articulation tests and the Wepman Auditory Discrimination test have been administered to all the children in both the experimental and control group. The speech improvement lessons are being taught by the speech correctionists to the children in the experimental groups. These lessons are taught one-half hour each week. The classroom teacher remains in the room during the lesson. The speech improvement lessons are presented according to a syllabus which was prepared in advance of this study. Each participating speech correctionist follows these planned lessons which makes for uniformity of materials and methods used with each speech improvement class. The children with speech defects in the experimental groups are not being taken out of their class for speech therapy during the time of this study. The children in the control groups will not be receiving the speech improvement lessons, but those with speech deviations will be taken from their class to receive regular speech therapy one period each week. At the close of the school year, articulation tests, Form 2 of the Wepman Auditory Discrimination Test, and spontaneous speech evaluations will be made of each child participating in the study. It is hoped that the results of this study will indicate whether or not it is advisable to initiate a speech improvement program for first grade pupils. If such a plan is deemed advisable it would make for greater flexibility in programming the work of the speech correctionist thus providing service for more children with speech problems. (This research in speech improvement has been undertaken with the full cooperation of the Department of Instruction, the Department of Research, and the Speech Correction Staff of the Kansas City, Missouri Public Schools.)

F17—CURRENT CONCEPTS IN THE EVALUATION AND TREATMENT OF CLEFT PALATE.

Psychological Aspects of the "Cleft Palate Problem"—a Preliminary Report. D. C. SPRIESTERSBACH and GENE R. POWERS, *State University of Iowa*—The State University of Iowa, supported by a grant from the National Institutes of Mental Health, is in the process of completing a five-year study of 175 families with children having cleft lips and palates and 175 matched control families. The children have ranged in age from new-borns to 16 years. A part of the study has involved taking a detailed, coded case history from both parents of each child studies. Approximately 200,000 coded items of information have been obtained from the experimental group families and 150,000 items from the control group families. In addition, the children of the experimental group families have been given medical, dental and speech examinations. Differences between the subgroups of the experimental sample and between the experimental and control samples will be examined to support the hypothesis that the "cleft palate problem" involves far more than a lack of continuity of certain oral structures.

Rationale and Methodology for Cleft Palate Speech Therapy. KENNETH R. BZOCH, *Northwestern University*—The purpose of this paper is to present a rationale of therapy based upon a descriptive analytic appraisal of the actual speech problems of some 500 cleft palate patients who have received therapy over the past twelve years at the Northwestern University Cleft Lip and Palate Institute. Six distinct types of speech problems were found in this population as follows: (1) Resonance balance problems related to velopharyngeal insufficiency. (2) Articulation errors described as gross sound substitution patterns related to over-development of laryngeal and pharyngeal constrictions in speech. (3) Developmental articulation disorders. (4) Speech problems related directly or secondarily to dental hazards. (5) Speech disorders related to breathing and formation adjustments secondary to cleft palate. (6) Speech defects related to hearing problems secondary to cleft palate. Statistics are presented for the total group as to the occurrence of these and sub-types of speech disorders in the total population studied. Evaluation of the effectiveness of prosthetic, surgical, and dental approaches to the correction of the organic speech problems was made from the records of the Institute. A clinical evaluation of the success of the usual approaches in speech retraining is also given. Some unusual methods in speech retraining such as direct muscle massage of the velum, multiple sound articulation training, and a vowel approach to articulation retraining will be described and evaluated with illustrations. The findings of this clinical appraisal suggest that most of the speech problems of the cleft palate patient are of a functional nature. Cleft palate speech is really a complex of a number of types of speech disorders including delayed speech development, unusual gross articulation substitution pattern, developmental articulation disorders, hypernasality, distortion from nasal emission, breathiness and others. Many of these problems persist even after complete medical and dental rehabilitation unless the proper speech therapy approach is used. Cleft palate speech can be and most often is eliminated in the pre-school years if early and concentrated therapy in close coordination with medical and dental treatment can be obtained.

F18—CONTRIBUTED PAPERS IN AUDIOLOGIC REHABILITATION.

A Radiological Method of Teaching Normal Speech Production to the Aurally Handicapped. Robert F. Sloan, Franklin L. Ashley, Howard A. Grey, Elise, Hahn, Alfred Larr and William Hanafee, *University of California*—This paper will demonstrate how cinefluorography may be used to illustrate to teachers of the aurally handicapped (and to the aurally handicapped themeslves) the kinesiology involved in normal speech production. An anatomical orientation precedes the radiological material. Selected speech segments are presented to illustrate the articulatory movements, so that physiological duplication of viewed kinesiology will result in articulation of the desired speech patterns. The subject's speech mechanism was coated with radiopaque material by oral intake of barium concentrates. A Westinghouse Image Amplification Unit and Cinecamera were used for the presentation. (This work was supported by Grant-In-Aid No. RG-6665 (A), United States Public Health Service.)

Serial Learning of Trains of Pulses Simulative of Speech and Language by Young Deaf Adults. F. S. Berg, *Southern Illinois University*—The acquisition of native language is the key to the habilitation of the deaf. Language is inwrought with serial arrangement. In its connected form, it consists of expressed thought, chained in series. Each thought, in turn, is composed of responses that are similarly serially associated, and may be manifested as words. As expressed in audible symbols, language may be more accurately described as chains or trains of syllables. The acquisition and use of words or syllables in various sequences and groupings comprises much of education in particular and behavior in general. The present study proposes to determine to what extent the deaf can use residual hearing to serially learn material representative of the frequencies of speech and simulative of the syllables of connected language. The anticipation learning technique was used. The material consisted of trains of pure tone pulses, 1000, 2000, and 3000 cps in frequency, occurring at rates of three, four, and five times per second, that could be identified as the digits one through five. The equipment for the preparation and the presentation of the pulses included generating, recording, editing, dubbing, and playback devices. No significant differences in learning existed between deaf and nondeaf undergraduate college students who served as subjects. Comparisons were made of number of trials to learn, learning curves, and serial position curves. The curves were classical in form in all instances. The major conclusions were: (1) A young deaf adult is not handicapped in the serial learning of auditory material that he can identify. (2) The findings concerning the use of the auditory sense in the education of the deaf present a challenge in the field of deaf education. (This paper included information from a research paper to be submitted in partial fulfillment for the requirement of Doctor of Philosophy Degree, Southern Illinois University.)

Efficiency of Warble-Tone in Hearing Aid Selection. Donald B. Kinstler, *Los Angeles State College*—Adult subjects, grouped into those with (a) conductive hearing losses, (b) mixed losses with flat pure-tone thresholds, (c) mixed losses with abruptly sloping thresholds, and (d) receptive losses with abruptly sloping thresholds, were administered warble-tone sound field tests and discrimination tests utilizing the PB-50 and CID word lists. Rank order of hearing aid selection based upon warble-tone results was compared with hearing aid selection based on discrimination scores. Results indicate: (a) warble-tone alone may be employed successfully in hearing aid selection for the majority of losses, (b) warble-tone is particularly efficient in the selection of aids for subjects with sensori-neural abruptly sloping high frequency losses, and (c) warble-tone as a selective device is less efficient than warble-tone with conductive type losses.

F19—STUDIES IN NEUROLOGIC DISORDERS.

Use of the Wechsler intelligence scale for children as a diagnostic and evaluative instrument for language dysfunction associated with brain damage in children who fail in school. Empress Y. Zedler and John R. Cochran, *Southwest Texas State College, San Marcos, Texas*—The purpose of this paper is to report how the WISC was used to recognize, evaluate, and plan therapy for language disorders associated with brain damage in school children classified as "normal" except for academic failure. In the process of assessing the mental capacity of children with adequate sensory and motor equipment who have been referred for testing because of academic failure, certain behavioral and statistical signs seemed to be grouped consistently in those who attained normal IQ's. This grouping included some typical symptoms of aphasia, but also included numerous signs not classically associated with brain damage. The investigator prepared a rating scale of these consistent manifestations. One hundred children were rated on this scale of variables. All were referred for neurological evaluations. The relationship between neurological findings and ratings on the scale of variables was highly significant and positive. Implications from the pilot study are (a) that the WISC may be diagnostically used to discover and evaluate children with minimal organic brain dysfunction before the disorder is manifested in academic failure, (b) that classical interpretation by educators of results obtained on the WISC should be altered, and (c) that clinics for language disorders in children could use the WISC effectively in evaluating modalities and planning therapy. This pilot study is being expanded into a research project with a control group of subjects who do not have academic learning problems and who, on the WISC do not manifest the behavioral syndrome observed in the group with CNS involvement. The control group will be evaluated neurologically under the same conditions as the experimental group. By November, 1960, the investigator will be able to report some correlations between the two groups of subjects.

Articulation of Difficult Consonants by Children with Cerebral Palsy. Orvis C. Irwin, *Institute of Logopedics*—This report deals with the status of articulation of a set of ten difficult consonants by cerebral palsy children. The consonants in order of difficulty are: s, z, d͡ʒ, t͡ʃ, ʃ, θ, ð, r, t and ʔ. The selection of the ten consonants was based on a tally of sounds common to lists of difficult sounds reported in the literature. They were used in the initial, medial and final positions in words. The aims to the study are to determine if sex differences exist, what the relation is to CA, MA, and IQ, to determine the effect of position in words, the relation to the medical diagnosis, the relation to extent of involvement, and if there are differences in the articulation between right and left hemiplegics. Data were collected on 333 cerebral palsy children from six eastern states, four southern, and four midwest states. The reliability of the test was determined by a Kuder-Richarson formula applied to the data of each of the three positions. The correlations were .86, .87, and .86. A temporal constancy coefficient of .79 was found by a retest on 34 cases after an interval of 21 days. Sex differences are not present in the scores. Correlations of scores with DA, MA, and IQ were .04, —.03, and .16. Concerning position of the consonants the means of the initials exceeded those of medials and finals. The mean differences were significant at the .05 level or less. The mean scores of spastics exceeded that of athetoids, the difference being significant at the .001 level. Paraplegics did better than quadraplegics and hemiplegics. The means of right and left hemiplegics were the same.

Language Inhibition as a Therapy Technique with Brain-Damaged Children. KENNETH J. KNEPFLAR, *Crippled Children's Society of Los Angeles County*—There is currently a great deal of interest in so-called aphasoid children, those who fail to develop suitable language. In studying the language behavior of brain damaged children, this writer has found many children with a kind of language behavior which has received little or no attention in our field, and indeed which has not, in most instances, been identified as abnormal speech or language functioning. These are children with known brain damage who have an abundance of expressive language, which often is not appropriate to a given situation from the standpoint of content or extent of utterance. Psychological evaluations of such children often show comparatively high verbal abilities, with extremely low functioning in logical and abstract areas. The one success that these children have is often their ability to echo rather complex combinations of words they have heard. Often these utterances appear in appropriate situations, probably as the result of conditioning and not because of real comprehension of the words involved. As such children grow older more complex language functioning fails to appear. The increase in age is also often accompanied by enlarged disparities between areas of intellectual functioning, and verbalizations continue but become progressively inappropriate socially. They sometimes dominate conversations with little appropriateness or meaningfulness. Such verbalizations can interfere with further language development. It is felt that such children often are seen once by a speech therapist and diagnosed as normal, inasmuch as articulation and voice are within normal limits. Therapy techniques which have been developed to inhibit the rote development of meaningless language and to encourage sound, meaningful concepts will be discussed. It is felt that therapists should not always feel that normal articulation and voice and the presence of connected speech, particularly in brain-injured children, indicates adequate acceptable speech and language functioning.

Suggested Exercises for Facial Paralysis or Paresis. D. R. FOX, *Clay County, Missouri, Health Department,* and LOIS HUEBERT, *Institute of Logopedics*—Unilateral or bilateral paralysis of the face can sometimes result from polio, cerebral vascular accidents, Bell's Palsy, and other etiologies. Since any one of them may be far more debilitating than the facial involvement, treatment for the facial paralysis is often delayed or overlooked. The authors feel, however, that this condition should be considered in the over-all plan for treatment. Often these cases are referred for both therapies, and since the literature concerning this subject is very sparse, the authors have worked out a series of exercises, primarily of the resistive type, and have applied them in special cases under medical supervision. The techniques were later applied in clinical practice with other patients and are offered as supplemental therapy to other indicated treatment. A presentation of the muscles of the forehead, nose, cheek, mouth and jaw follows, and exercises are suggested for particular activities. The exercises are fairly simple and can be administered by either the speech or physical therapist. The authors caution that they are interested in exercising the more gross motion needed for facial expression and function, and they feel that the exercises should be administered only under medical supervision. Two case history presentations follow.

F20—EXPERIMENTAL PHONETICS IV: INSTRUMENTATION.

The Validity of Certain Aspects of Laminagraphic X-ray Technique as used in Laryngeal Research. HARRY HOLLIEN, *Institute of Logopedics* and *University of Wichita.*—Nearly all of the laminagraphic research on the larynx has been carried out with subjects in the supine position. The distorting effects of the pull of gravity upon the laryngeal structures, when a person is in such a position, are not known. Accordingly, it was the purpose of this study to discover (a) if placing the subject in the horizontal position has created systematic errors in previous research, and (b) if trends for decreasing vocal fold cross sectional area and mean thickness with rise in fundamental frequency of phonation would be found with subjects positioned vertically. Subjects included eight adults (four males and four females) chosen on the basis of age, absence of speech or voice problems, and the ability to produce specified vocal tones easily. The range of fundamental frequencies, including falsetto, that each subject could produce was determined by a standard procedure. Final selection was made on the basis of these data, and all subjects within a sex had essentially the same pitch range. Subjects were required to produce three vocal pitches within their natural pitch range. These pitches were specified in relation to total pitch range and were located as proportions above the lowest sustainable tone. The 10, 25 and 50 per cent points to the nearest semitone were used. Vocal intensity was controlled by a standard procedure. Laminagrams were made of subjects phonating these vocal pitches—first with them in the supine position and then again with them positioned vertically. Two measurements of coronal cross sectional area and one of mean thickness were made on the two sets of laminagrams and the trends were compared. The results permit the following major conclusions: (a) that, as expected, the cross sectional area and mean thickness of the vocal folds were systematically reduced with increases in the fundamental frequency of phonation with subjects in the supine position; (b) that an identical trend was noted with subjects positioned vertically; and (c) that although there were slight differences in the absolute magnitudes of the paired means, the two trend lines were parallel. In summary, these data tend to show that laryngeal research utilizing laminagraphic x-ray techniques may be considered valid even though it is necessary to position subjects horizontally. (This research was supported by National Institutes of Health Grant B-2164.)

Electrical Stimulation of Paired Muscle Groups as a Means of Determining Native Sidedness. RICHARD M. COLE, *Northwestern University*—Those concerned with disturbances of communication have long speculated on a possible relationship between hand preference and the adequacy with which children are able to acquire and utilize speech and language. Studies concerned with the question of hand preference have sought to produce objective diagnostic tests for "innate" handedness, and have served instead to provide additional tests of functional handedness. The present study entailed an exploratory investigation of the neuromuscular excitability of homologous muscle groups in left-handed, right-handed, and ambidextrous adults, to determine initially whether there were systematic differences in neuro-muscular excitability of muscles on the two sides of the body among these three groups, and whether these differences correlated with the individual's preferred handedness. Sixty subjects were chosen for the study, including left-handers, right-handers, and ambidextrous individuals. A handedness questionnaire, as well as a battery of performance tests, was administered to each individual in order to determine the degree to which he used one hand in preference to the other hand. Equipment generating a pulsed, square-wave current to surface electrodes was used to establish strength-duration curves on the following muscle groups: biceps brachii, triceps brachii, deltoideus, trapezius, rectus abdominus, and gracilis. To date, the data suggest that neuromuscular excitability of the muscles on one side of the body differs from that on the opposite side of the body in all of the several groups tested, and that the side of the body exhibiting lower thresholds to electrical stimulation tends to coincide with the preferred hand. Whether these differences can be

demonstrated in infants and whether the side of the body exhibiting lower thresholds to electrical stimulation tends to coincide with the preferred hand, once handedness has been established, remains to be seen. (Ph.D. dissertation under the direction of Harold Westlake.)

A Methodological Study of Surface Electromyography Applied to Speech Breathing. ROY E. EBLEN, JR., *State University of Iowa*—Surface electromyography has been used by Stetson, Draper, *et al.*, and Hoshiko to obtain information about the activity of the respiratory muscles in speech. Particular attention has been directed to the intercostal muscles in their role as the source of the chest pulse first reported by Stetson. The findings of these investigators as well as others who studied the action of the intercostals in nonspeech breathing are contradictory in many respects. Valid inferences about the action of these particular muscles from the action potentials recorded by surface electrodes is difficult because of the arrangement of the overlying muscles which may contaminate the electrical signals. There are other variables involved in the circumstances of contraction of these muscles which may produce different signals. It is the purpose of this study to set up a series of experimental situations in which the variables will be rigidly specified in order to test the hypothesis that electromyographic recordings of respiratory muscle activity can be obtained by surface electrodes in which (1) the muscle being recorded can be confidently identified, and (2) some action potentials recorded from either the anterior or posterior body wall will correlate with the pressure variations which occur during speech. Action potentials from several locations on the anterior and posterior body wall will be recorded simultaneously with measurement of intra-esophageal pressure, rate of air flow, and various speech signals, including a prolonged vowel, repeated nonsense syllables, and a connected passage. The subjects will be studied in the supine, seated and standing positions. The speech materials will be uttered as nearly as possible with constant intensity and pitch level. All of the electrical signals will be fed into an eight channel Grass electroencephalograph. The use of the multi-channel technique may enable one to sort out the signals from the muscles of interest from the signals of possible contaminants. Under what conditions, if any, this is possible will be described with the data to be obtained. (This study is being done at the University of Iowa under the direction of Dr. James F. Curtis.)

A radiological comparison of phonation and swallowing with cinefluorography.* ROBERT F. SLOAN, F. L. ASHLEY, ELISE HAHN, and WILLIAM HANAFEE, *University of California Medical School at Los Angeles*—This paper presents a comparative analysis of the physiology of phonation and swallowing. Each patient's speech areas are coated with radiopaque film by oral intake of both the fluid and thick barium concentrates. A speech examination is filmed following these swallowing procedures. Both normal and pathological speech cases are tested. A Westinghouse Image Amplification Unit and Cinecamera are used for the examination. The mechanics of phonation and swallowing are compared, in order to develop two separate diagnostic techniques. From the Divisions of Plastic Surgery, Speech Pathology, and Diagnostic Radiology, University of California, Los Angeles 24.

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SATURDAY, NOVEMBER 5

S2—PARENT EDUCATION REGARDING SPEECH DEVELOPMENT AND SPEECH DISORDERS.

Some Parental Concepts of Speech Problems. WILLIAM H. CANFIELD, *Teachers College Columbia*—A survey of 231 speech clinic reports filed in a college speech clinic revealed some common parental attitudes towards children's speech problems. The data collected came from diagnostic speech interview questionnaires and case history reports. This information is important for the speech clinician if he or she is to provide adequate counseling and speech education for parents or if children receiving speech therapy are to obtain the help they need in order to make the most progress and improvement in speech. The survey contains data about the following items: (1) Reported age of talking, (2) Family speech history, (3) Sources of referral to the speech clinic, (4) Parental labels of speech problems, (5) Parental comments about speech problems, (6) Parental attitudes expressed about speech problems, (7) Parental reports of the children's reactions to their speech problems, (8) Parental reactions to recommendations for speech therapy. The findings of this survey indicate that many parents tend to be overly anxious about their childrens' speaking abilities. Such anxiety may be needless, and it can be detrimental to the speech clinician as well as to the children who feel great pressure at home to improve speech. Parents may confuse the types and severity of speech problems because of their lack of information or their mis-information about speech defects and speech improvement. Speech clinicians who are aware of some of these concepts and attitudes which parents may have should be better able to provide meaningful speech therapy services to children and their parents. (This study was done as part of a doctoral study entitled, *A Handbook for Parents of Speech Handicapped Children,* under the direction of Dr. Jane D. Zimmerman.)

The Role of Parents in Children's Speech Development. HALVOR P. HANSEN, *College of the Pacific, Stockton, California*—The purpose of this study was to inform interested parents of the nature of normal speech development and of children's speech problems. Specifically, the following were the objectives of the speech program: (a) to inform parents of the speech development in children during infancy and childhood, (b) to acquaint parents with children's speech problems, (c) to provide parents with an understanding of basic home helps for improving the child's speech, and (d) to present parents with the information they need in order to cooperate intelligently with speech specialists. Participating in the study were *16* male and *55* female parents of speech handicapped children, nonspeech handicapped children, and parents who were classroom teachers, public health nurses, pediatricians, and speech specialists. The age range was 38. Six, two-hour meetings were provided. In each of the six meetings methods of instruction used were lectures, specially prepared pamphlets, tape recordings and films, plus specific problems from the participants. Problems of language development, stuttering behavior patterns, and speech problems concomitant with impaired hearing, cleft lip and palate, and cerebral palsy were the topics covered. Analysis of an open-end questionnaire administered at the cessation of the program revealed the following gains made by the parents: (1) a better understanding of the normal development of speech in the infant and child; (2) a better understanding of children's speech problems; (3) a better understanding of impaired hearing, cleft lip and palate, and cerebral palsy as related to speech development; (4) reassurance that children with speech problems are frequently "normal" children who differ only in speech; (5) an understanding of basic home helps for improving the child's speech; (6) a better understanding of the function and purposes of a speech and hearing clinic; (7) a better understanding of the role of speech specialists and some of the basic therapeutic techniques that are used by speech specialists; (8) sufficient insight into children's speech problems to make it possible for them to seek the advice of a speech specialist; (9) more awareness of the need for the school employment of speech specialists.

A Specific Approach to Parent Education in a Public School Program of Speech Therapy. VIRGINIA G. BAIRD, *Junior League School for Speech Correction and Atlanta Public Schools,* and ROBERT L. MCCROSKEY, *Emory University*—Speech samples were obtained from 40 second grade children who had articulatory disorders which did not have any apparent organic basis. All recordings were made on an *Ampex* 960 using an *Altec* microphone (661-B). The children were randomly assigned to two groups. Both groups received the same therapy except that the parents of the children in Group I were exposed to three individual conferences while the parents of those in Group II were not seen during the experimental period. The data were analyzed by randomly presenting 30-second segments of speech, from both the experimental and control groups, obtained at the beginning and at the end of an academic year. Analysis of variance between and within groups was the method of statistical treatment. The results indicate that both groups improved significantly and that the trend, with respect to degree of improvement, was in favor of the experimental group. The reported results include not only a statement of the effectiveness of the parent program but also a rather complete specification of the difficulties to be encountered in this type of research.

A Study of the comparative effectiveness of two methods of presenting to parents information relative to speech and language development in the child. R. RAY BATTIN, *Hedgecroft Hospital and Rehabilitation Center, Houston, Texas*—This study attempted to determine which of two methods, a television presentation or a regular classroom lecture, was the more effective means of presenting information to parents relative to speech and language development in the preschool child. The comparison was made on the basis of presentation, audience acceptance, and audience gain. The latter was evaluated in terms of change in basic attitudes and beliefs regarding the lecture subject following receipt of the information. Sixty-two mothers of preschool children participated in the experiment. Twenty-seven attended the classroom lecture while thirty-five viewed the television lecture. The instructor was the same for both lectures. The two groups were matched for age, education, socio-economic level, and number of children in the family. Each mother had at least one preschool child. Both groups of mothers were given the same test instrument before and after hearing the lecture. A second test, which evaluated the type of presentation as well as compared this means of presentation with other methods or media, was administered to the mothers following the lecture. The results of the study tend to support the hypothesis that facts on speech and language growth intended for mothers of preschool children are better received when presented in a regular classroom lecture than when this material is presented in lecture form over television. However, both television and classroom presentation provide a highly significant change in attitudes and beliefs toward this subject. There appears to be no difference between the two methods of presentation in terms of the amount of internalization or acceptance of the material. (This research was carried out as a doctoral study at the University of Florida under the direction of Professor H. P. Constaris.)

S3—THREE APPROACHES TO THE STUDY OF LANGUAGE DEVELOPMENT.

A Cross Cultural Study of Infant Vocalizations. CHRISTY C. SHERVANIAN, (Fulbright Scholar to the Netherlands) *West*

Roxbury, Mass.—This research attempts some preliminary answers to several important questions regarding the prelinguistic period of speech development. The speech sound vocalizations of over 60 Dutch infants under one year of age were transcribed employing the methodology developed by Irwin. The data were analyzed by means of speech sound profiles and the Irwin indices. Comparisons were made with the normative data based on the vocalizations of American infants. The findings revealed a truer picture of (1) the early so-called reflexive period of sound production when the vocalizations of infants are considered to be the outcome of vegetative movements, as well as (2) the period of early speech learning when cultural influences are first revealed. (This research was done while the author was a Fulbright Scholar to the Netherlands.)

The University of Michigan picture language inventory. H. Harlan Bloomer, *University of Michigan*—A test has been designed for the purpose of evaluating the development of certain language components in children. The prototype of this test was developed by Dr. Louis Lerea in 1957 under a special research grant directed by Dr. H. Harlan Bloomer. Subsequently, certain changes of content and administration were made to enhance its effectiveness. Briefly, the test consists of two principal parts, a vocabulary test and a language structure test. The vocabularly test consists of noun items selected from the Buckingham and Dolch word count. The language structure test evaluates the developmental use of the four main word classes, and three of the fifteen function word groups as described by Dr. Charles C. Fries in his work on structural linguistics. All responses are elicited with respect to pictures, and both expressive and comprehensive abilities are evaluated throughout. The study was conducted in Flint, Michigan, and results were obtained on 180 normal speaking children, 30 boys and 30 girls at each of three age levels, 4, 5, and 6 years. The subjects were carefully selected to control factors of age, intelligence, socio-economic level, race, bilingualism, and motor and emotional development. Analysis of the data allows the establishment of age levels of performance for the two principal parts of the test and for the various test sections, a study of possible sex differences in this development, and an evaluation of the nature of language development as measured by this test.

Analysis of children's connected speech samples. Frederic L. Darley, *State University of Iowa*— A standardized, readily repeated procedure for eliciting and analyzing samples of the spontaneous connected speech of children was developed 30 years ago by Dorothea McCarthy and subsequently amplified. Quantitative language measures obtained from analysis of 50 responses include mean length of response, mean of the five longest responses, number of one-word responses, structural complexity score, and the number of different words used, as well as indices of variability for each of these five measures. Recent refinements of the procedure are described including the use of mangetic tape rather than manual recording. Data regarding the validity and reliability of the measures are reviewed, including new information about temporal reliability and the relationship between reliability and length of language sample. Data obtained in a series of recent studies are reviewed which provide information about the following: (1) the effect upon children's language of changing social situations and cultural condition; (2) the influence of socioeconomic status upon language status; (3) sex differences in language skill; (4) the language status of cleft palate children; (5) the language status of non-dysarthric physically handicapped children; and (6) the relationship between language skills and selected gross and fine motor skills.

S4—RESEARCH IN STUTTERING: BEHAVIOR STUDIES.

Adaptational Decrement as a Function of the Level of Fluency. Eugene J. Brutten, *Southern Illinois University*—The adaptation effect refers to the behavioral finding that, all things being equal, stuttering responses decrease as a negatively accelerating descreasing function of massed readings. The lawfulness of this finding has led to numerous investigations of dependent changes resulting from manipulation of independent variables. Little research attention, however, has been devoted to the manner by which adaptation may differ with varying fluency levels; this, despite findings which suggest that mild and severe stutterers may not adapt in the same way. These data led Golub to conclude that "more research is obviously needed to demonstrate the conclusive differences, if any, between the performance of mild, moderate, and severe stutterers on the various measures of stuttering adaptation." The purpose of this study was to determine the extent and course of adaptation in an experimental population and to investigate the relative contribution to this adaptation of the severity subgroups within the sample. More specifically this research was concerned with the differences between: (1) the adaptation of a sample and the adaptation of within-sample severity subgroups; and (2) the adaptation of severity subgroups and the adaptation of a nonstuttering sample. The results of this investigation revealed that the severity subgroups differentially contribute to the total adaptational curve. The initial disparity in the between group frequency of stuttering behavior is maintained throughout the adaptation readings. Furthermore, the slope of the subgroup decrements appears to be an increasing function of severity. The adaptation of the nonstuttering population appears to approximate most that of the mild stutterer both in frequency and in course. These data suggest a behavior continuum rather than a dichotomy between the responses of the nonstutterer and the stutterer.

Temporal Variability in Stuttering Behavior on the Iowa Speech Fluency Test. Eric K. Sander, *Western Reserve University*—Various methods are commonly used to evaluate the speech improvement following therapy of individuals who stutter. Severity ratings made by the clinician, by outside observers, or by the stutterer himself are often employed. A descriptive procedure that has come to be known as the Iowa Speech Fluency Test appears promising as a tool for evaluating the progress of stutterers. Essentially, the test consists of eliciting a recorded sample of reading and spontaneous speech; the final test result is usually expressed in terms of the speaker's average number of nonfluencies per one-hundred words spoken or read. Using norms established by Johnson and his associates it is possible to express the speaker's performance in terms of his decile rank (the particular decile at or below which he falls) for a population of stutterers or nonstutterers. The test-retest reliability over 24-hours has been established for both the reading and speaking tasks of the Iowa Speech Fluency Test administered to 40 stutterers. Self-agreement of the experimenter in scoring total nonfluencies was found to be adequate. Test-retest Pearson product-moment correlation coefficients of .91 and .94 were found for total nonfluencies on the speaking and reading tasks respectively. Approximately one-half of the stutterers showed no changes in decile rating for reading and speaking tasks repeated after 24-hours. Shifts no greater than one decile were evidenced by four-fifths of the subjects. (This paper reports the major portion of an M.A. Thesis completed at the State University of Iowa under the direction of Professor Wendell Johnson.)

Speech Anxiety (Drive) and Degree of Response Competition as Determiners of Performance in a Verbal Learning Task. D. S. Lepson and G. J. Wischner, *University of Pittsburgh*—This study was concerned with the effect of speech (stuttering) anxiety on performance in a verbal learning situation. It was conceptualized with the framework of Spence's theory of emotionally based drive and also assumed that speech anxiety possesses properties functionally similar to those attributed to other kinds of experimentally manipulated anxiety. Different predictions with respect to ease of learning, were made for two kinds of items in the list to be learned. Half the

correct associations were to be acquired under a condition of maximal response competition and half under minimal response competition. Ramond's forced-choice variation of paired associates learning was employed. The material consisted of a specially constructed 18 item list exposed in a memory drum setup modified so that responses could be given either in the conventional oral manner or by operating a signaling device. Speech anxiety was manipulated by having one group of stutterers verbalize its responses and another group signal them by pushing a switch either up or down. Subjects were 44 stutterers and 44 normal speakers each divided into a speaking and signaling subgroup. The mean difference in performance between the speaking and signaling stutterer groups on the competitional items was in the predicted direction, (former inferior to the latter) but was not statistically significant. The difference between these groups on the noncompetitional items again was in the predicted opposite direction, (speaking stutterers superior to signaling stutterers) but again the difference was not significant ($p = .17$). The two groups of normals did not differ in performance. There was little difference between the performance of stutterers and normals. The results are considered in relation to theoretical issues and certain methodological considerations. Analysis of the latter suggested that speech anxiety probably was not manipulated sufficiently for an adequate test of the hypotheses. (Based on a Ph.D. dissertation by D. S. Lepson.)

An Investigation of the Effect of Speech Anxiety (Drive) Upon the Conditioning of a Finger Withdrawal Response. B. J. KARPF and G. J. WISCHNER, *University of Pittsburgh*—This study investigated the effect of speech anxiety (drive) upon conditioning of finger withdrawal to electric shock. It assumed that speech anxiety can summate with other drives to affect conditioning. It derived theoretically from (a) the learning formulation that level of conditioning is a function of generalized drive strength (D) and that emotionality is one factor contributing to D, and (b) the assumption that stuttering anxiety has functional properties similar to those obtained for other anxiety variables investigated in the learning laboratory. The effect of speech anxiety on conditioning was studied by comparing finger withdrawal conditioning of: (a) stutterers with normals; (b) three groups of stutterers assumed to differ in degree of emotionality or anxiety as a consequence of experimental attempts to manipulate speech anxiety by varying the reading task during conditioning. Tasks included: (a) continued reading, aloud, of constantly changing material (subgroup I); (b) repetitive reading, aloud, of a short passage of material (subgroup II); (c) continued reading, silently, of constantly changing material (subgroup III). Final results were based on a sample of 59 males, and 29 stutterers and 30 normal speakers. General procedure followed that employed by Fitzwater and Thrush in a study of conditioning parameter. Ss were given 100 trials, with 20 randomly interspersed test trials. CS was a tone of 1024 cycles. DS-UCS interval was 0.5″. Responses were counted as CR's if they occurred after onset of the CS but before an elapsed time of 0.7″. It was found that: (a) stutterers as a group conditioned significantly better than normal speakers; (b) performances curves for stutterer subgroups were generally higher than those for corresponding normal groups; (c) stutterer subgroups tended to be differentially affected by the experimental conditions, but differences among stutterers were not statistically significant; (d) normal subgroups did not appear to be differentially affected by the experimental conditions. The results suggested the validity of the hypothesis that stutterers are more emotional or anxious than normal speakers, at least in a finger withdrawal conditioning situation. Partial support was provided for the hypothesis that speech anxiety can be manipulated to affect level of conditioning performance. (Based on a Ph.D. Dissertation by B. J. Karpf.)

S5—MEASUREMENT OF HEARING IN CHILDREN.

The Reliability of Hearing Test Results on a Random Population of Children in a Clinical Situation. JACQUELINE KEASTER, *Childrens Hospital of Los Angeles, University of Southern California*—The hearing of a random sampling of children ranging in age from five to twelve years with a complaint of hearing loss was tested by: (1) an experienced audiologist; and (2) an inexperienced technician. Each used the same pure tone audiometer. The validity of the test results was checked with the speech audiometer, using pictures or spondee words as stimuli. Data have been processed with the following questions in mind: (1) Is there a close correlation between test results obtained by an experienced and an inexperienced tester? (2) Are correlations higher at some frequencies than at others? (3) How valid are test results as measured by the speech audiometer? (4) Are correlations higher among younger or older children? (5) Are correlations higher for conductive than for neuro-sensory losses? (Support: Deafness Research Foundation, New York, N. Y.) (Results not available at time of publication of abstract.)

Speech Discrimination Testing with Children. BERNARD A. LANDES, *Texas Technological College*—An integral part of the complete audiological battery in the assessment of hearing loss includes evaluation of the patient's responses to speech as a stimulus. Such tests have been standardized, largely, on adult populations, with some normative data on children who are sufficiently mature and articulate to give verbal responses when such responses are not affected by speech defects. If the child is immature, or if he has an articulation defect, it is impossible to evaluate an erroneous response in terms of whether he failed to *hear* the stimulus correctly, or whether he simply cannot *repeat* it correctly because of the speech defect or immature speech. If the expected responses were nonverbal in character, an erroneous response could be construed to be a result of a defect of hearing, specifically, a discrimination loss pathognomonic of cochlear involvement. A group of normal preschool and young school-age children was tested. The hearing of each subject was demonstrated to be normal by standard pure-tone techniques prior to further testing. Then, with the subject seated in a sound-treated chamber, a series of words (preceded by a carrier phrase: "Show me the . . . .") was presented through a calibrated speech audiometer and loudspeaker system. The subject was required to respond to each command by designating manually one of several pictures on cards within his reach. The nature of the series of key words was taken, for the most part, from the Thorndike lists of words familiar to children; furthermore, the words were analyzed and grouped according to phonetic makeup, similar to the PB-50 word lists. Normative data were derived statistically from results of a number of such tests. Although the technique of pointing to picture cards has been used and reported by such investigators as Keaster, etc., this is believed to be the first attempt to use the technique for discrimination testing beyond speech reception threshold testing.

A Study of Hearing in Children: Acoustic Environment and Audiometer Performance. E. L. EAGLES, *Graduate School of Public Health, University of Pittsburgh*, and L. G. DOERFLER, *School of Medicine, University of Pittsburgh*—Since 1957, a long term, joint study of hearing in children has been conducted by the University of Pittsburgh's Graduate School of Public Health and the Subcommittee on Hearing in Children Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. Data have been collected on the hearing levels, otological status and the health of approximately 4000 school and preschool children. In order to measure hearing levels accurately at intensities well below the existing reference level it became necessary to establish the proper acoustic environment and to employ accurate audiometric instrumentation. Data will be presented showing existing noise levels in schools and the method employed to achieve the ambient noise levels required to test at low intensity levels typical of hearing in normal children. The choice of audiometers presented problems in terms of accuracy and stability. Currently available audiometers did not prove satisfactory and

modifications were necessary to ensure linearity and accuracy of tone presentation, as well as general adherence to the American Standard Specification. The performance of six audiometers was monitored by means of frequent (weekly and monthly) laboratory calibrations over a period of two years. Significant variations in several aspects of audiometer performance will be described and tentative recommendations made for ensuring audiometer accuracy including frequency of calibration. (Supported by funds from the American Academy of Ophthalmology and Otolaryngology, Grant Number B 2375 (C3) from the National Institute of Neurological Diseases and Blindness to the Academy; and by Children's Bureau Grant Number 2407-12-7-1218 to the University of Pittsburgh, through the Pennsylvania Department of Health.)

Childhood Nonorganic Hearing Loss. G. J. LESHIN, *Oregon State Board of Health*—In Oregon a child is referred for medical attention if he indicates an average 20 decibel loss in the speech range (500-2000 C.P.C.) or an average 25 decibel loss in the high tone range (3000-6000 C.P.S.) on an individual test. This applies to either ear. During the 1958-59 school year staff audiometrists of the Oregon State Board of Health administered screening and individual hearing tests to 123,428 children in kindergarten through ninth grades. Of this group 4,589 or 4.1% of the initial test group; 1,239 or 16.1% of teacher-nurse referrals; and 1,928 or 45.2% of rechecks of the previous year's hearing loss cases failed to pass the test criteria. It was recognized that at the time of audiometric testing in schools some children would have had colds or temporary conditions which would perhaps clear up spontaneously. In order to prevent over-referrals to private physicians from the audiometric testing program in the schools, the otologic screening clinic was brought into existence. During the 1958-59 school year, 1,902 children were seen at the otologic clinics and of these 877 or 46.1% were referred on to their private physician for medical care. In a limited number of cases it was difficult to reconcile the medical with the audiological and case history findings. In these instances a more complete audiological work-up including speech audiometry, play techniques, and counseling were undertaken. In addition the medical social consultant interviewed the parent in an attempt to gain further insight. A review of the statistics indicated that in 48 cases, or approximately two and one-half per cent of the children seen at otologic clinics, the hearing loss was of nonorganic origin. Several specific cases of nonorganic hearing loss are discussed and the methods of gaining insight are reviewed.

S6—EXPERIMENTAL PHONETICS V: SPEECH ANALYSIS.

The Phonetic Symbolization of "Malephones." H. H. BLOOMER, *The University of Michigan*—This paper proposes the introduction of a new term, "malephones," to be used with reference to sound distortions as one of the categories of articulatory defects. The term combines the word roots "male," (bad) and "phone," (sound). It is thus related to the linguistic designations of speech sounds such as *phonemes* and *allophones*. Whereas "malephones" comprise a significant proportion of the sound units identified in defective articulation, no system of diacritics has been adopted which enables a speech pathologist to describe economically the nature of the aberrant articulatory movements or the mal-positioning of articulatory structures responsible for the sound distortion. J. Trim proposes a partial solution to this problem through the use of certain modifiers used in IPA. This paper introduces approximately twenty diacritical modifiers which are essentially pictographic in form. They indicate structures, position, and direction of movement, and are intended for use with phonetic symbols typically employed in phonetic transcription of speech. It is believed that they can be used with sufficient flexibility to describe nearly any aberrant sound for which an examiner can detect the responsible aberrant movements. Its use thus requires not only the "trained ear," but also the "trained eye."

The Effect of Phonetic Environment Upon the Acoustic Distinctive Features of Certain English Consonants. CLARA N. BUSH, *Stanford University*—In the specification of the acoustic characteristics of the distinctive features outlined by Jakobson, Fant and Halle in *The Preliminaries to Speech Analysis*, phonemes have been considered in the traditional linguistic context of identical phonetic environment. The specification of a given phoneme, however, must be appropriate to that phoneme as it is represented in speech in all permissible phonetic contexts and positions in utterance. The present study undertook to investigate the effect of changed phonetic environment upon the acoustic characteristics of four English fricatives, [f, v, θ, ð], in the light of their opposition classifications as Tense/Lax and Grave/Acute in the distinctive feature analysis. The phonemes were represented in both medial and final positions with respect to four stressed vowels, [i, æ, a, ɪ]. Samples of each item, produced by four men and four women, were subjected to acoustic analysis and relevant acoustic measures were taken. Results are presented for individual consonant phonemes as well as for opposition pairs on the relevant distinctive feature parameter. Acoustic characteristics display certain variability associated with the consonant cognate pair, the Compact/Diffuse nature of the adjacent stressed vowel, and the consonant position in utterance. As a consequence of this variability, the acoustic characteristics of the Tense/Lax and Grave/Acute distinctive features, as specified for the phonemes under study, are not consistently realized in the sounds of speech. The findings are discussed in terms of both the acoustic specification of the distinctive features involved and the distinctive feature specification of the phonemes investigated. (Study done in conjunction with a doctoral dissertation directed by Dorothy Huntington at Stanford University.)

A Preliminary Investigation of the Perceptual Characteristics of Inter-Phonemic Transitions. DONALD DEW, *University of Maryland*—Synthetic syllables, composed entirely of sustained sounds from which all transitional cues were removed, and corresponding syllables spoken in a natural manner were presented to thirty-six listeners for identification. Both sustained sounds and natural syllables were read by two trained speakers and tape recorded. By a tape-editing procedure, twelve sustained consonant, [m], [n], [θ], [ð], [f], [v], [s], [z], [ʃ], [ʒ], [ɹ], and [l], were jointed with each of five vowels, [i], [ɛ], [æ], [a], and [u], in both prevocalic and postvocalic positions to form sixty consonant-vowel-consonant syllables. Care was taken to match the phonemes in natural syllables in duration and intensity. Synthetic and natural syllables were presented in a random order to the trained listeners for phonetic transcription. In general, these data show: (1) more incorrect responses and omissions were found for all consonants and all but one vowel in synthetic syllables, (2) Error responses were scattered over a greater range of phonemes for synthetic syllables, (3) Vowels were recognized correctly more often in both synthetic and natural syllables, (4) Consonants in synthetic syllables were confused more often with consonants of a different manner and place of articulation, while voicing was rarely confused, and (5) Consonants were affected differently when combined with different vowels and in different positions with the same vowel. Hence, it would seem that these inter-phonemic transitions do contribute in a particular fashion, as yet not completely understood, to the recognition of phonemes in a speech context. (This paper is based on an M. A. thesis completed under the direction of Prof. James F. Curtis at the State University of Iowa.)

An Exploratory Study of Diphthong Formants. ANTHONY HOLBROOK, *Wayne State University*—By means of the sound spectrograph the variations of the frequencies and amplitudes of the lower three formants for six diphthongs spoken in context by 20 male GA speakers were measured as a function of time, with the following major findings: Durations of the formants were relatively short in [eɪ], [oʊ], and [ju], longer in [aɪ], [ɔɪ] and [aʊ]. Formants One and Two coincide approxi-

mately throughout except in [ju] where Formant Two tended to be shorter than Formant One and to be discernible during the first two-thirds of the utterance only. Formant Three started comparatively late in [oʊ] and [ɔɪ]. It subsided before the ends of [ʊ] diphthongs but tended to persist to the ends of [ɪ] diphthongs. The frequency of Formant One (F_1) and the frequency of Formant Two (F_2) diverged during their course in [eɪ], [aɪ] and [ɔɪ], tended to maintain a constant ratio as both lowered during [oʊ], and converged during [aʊ] and [ju]. The rate of change of F_2 accelerated in the last half of [aɪ] and [ɔɪ]. The amplitude of Formant One (A_1) and the amplitude of Formant Two (A_2) tended to increase slightly at first and to decrease thereafter, becoming lower at the end than at the beginning. A_2 appeared to be capable of differentiating classes of diphthongs, being prominent in [ɪ] diphthongs, weak in [ʊ] diphthongs. Coordinate plots of F_1 and F_2 revealed extensive overlap among the diphthong areas, but lawful relationships were apparent. Only one formant could be identified in the lower frequency range of some samples of [ɔɪ] and [oʊ] during the early portions of their durations. In [eɪ] and [oʊ], the rate of change of F_1 and F_2 was fairly regular, but in [aɪ], and [aʊ] and [ɔɪ] about two-thirds of the frequency change occurred in the last half of utterance. In relationship to the locations of vowels in the F_1 and F_2 coordinate plane. [eɪ] started in the proximity of [ɛ] and ended close to [ɪ]; [aɪ] and [aʊ] started between [æ] and [ɑ], with [aɪ] ending close to [ɛ], and [aʊ] close to [ɔ]; [ɔɪ] started near [ɔ] and ended close to [ɛ]; [oʊ] also started near [ɔ], passed through [o] about midway in its course, and ended near no vowel; [ju] started between [i] and [ɪ] and ended near [ʊ]. (This research was done under the direction of professor Grant Fairbanks, as a Ph.D. dissertation.)

S7—THE PROBLEM OF TONGUE THRUSTING.

Public school speech therapy program of clinical techniques used in muscle retraining for the treatment of tongue thrust. GLENN SMITH, *Fullerton, California Public Schools*—The Public school speech therapy program in some instances requires the adaptation of certain clinical techniques. This, we believe is true when the therapy is concerned with muscle retraining for the correction of tongue thrust. We have considered several important factors of therapy and present them together with comments relative to their application in the public schools:

(1) Referral: We need a direct referral and diagnosis from a member of the dental profession, "This child has a tongue thrust and needs muscle retraining therapy." (2) Evaluation: If for no other reason, we are bound by state regulations to provide therapy only for those children whose speech could be improved, for certainly this criterion would encompass the largest share of the school population. We are speaking of children whose speech is defective as evaluated by Dr. Charles Van Riper's familiar definition. (3) Dental Profession: Good communication with dentists and orthodontists is imperative. They can supply us with evaluation records, advice regarding appliances to be used and the most propitious time for instituting therapy. They can give strong support to our therapy by advising parents with regard to the necessity for home practice under careful supervision. (4) Parents: A carefully structured explanation of the problem must be given to the parents. They must attend and observe therapy sessions at regular intervals. (5) The school: We need the understanding and support of all school personnel. (6) Research: Continued research is needed and the opportunities for field research in this area of speech therapy are limitless. (7) The Child: Each case is unique and must be treated accordingly. Results are obtained when the child has a clear understanding of the problem and is willing to practice his therapy lessons daily.

We continue to make progress in adapting clinical techniques to our public school programs of speech therapy. No clearer evidence of this fact could be presented than our report on this pilot study.

S8—RESEARCH ON WORD INTELLIGIBILITY.

The Motivation Effect on PB Word Discrimination Test Scores. I. MALLES, *Industrial Home for the Blind*, and M. BERGMAN, *Hunter College, N. Y.*—Clinical audiologists have long recognized the instability of repeated PB discrimination test scores. In routine clinical practice there has been a tendency to accept differences in such scores on a single set of comparisons. The patient's motivations or expectation of performance under different conditions have received little attention. We have been struck by the role of suggestion and expectation of improvement in hearing and in discriminating speech through the use of a hearing aid in those patients who have borderline losses of hearing. Specifically, it appeared that the benefits provided by a hearing aid in some of these cases was more the result of the patients' desire to achieve improved hearing with a hearing aid than the instrument could be expected to provide electroacoustically. To test the foregoing thesis a group of blind subjects with mild hearing impairments, particularly those with only high-tone losses, was given discrimination tests in the presence of white noise under three different listening conditions. PB word scores were obtained when the subjects listened: (a) unaided, (b) with an ear insert ("ear mold") which had been scooped out to leave only a thin plastic shell to give the impression of hearing through a hearing aid although nothing was affixed to the insert, and (c) when "bone conduction hearing aid" spectacles were worn but not turned on. The test results, following repeated testing under each condition, clearly showed the influence of suggestion and motivation in certain cases.

Relative Stability of Half-List and Full-List Discrimination Tests. BARRY S. ELPERN, *VA West Side Hospital, Chicago*—The infrequent but persistent occurrence of research involving abbreviated tests of auditory discrimination ability led to the consideration of the feasibility of such tests as routine clinical procedures. The traditional 50-word discrimination test has often been reduced by administering only 25 words. The validity of this procedure may be evaluated by administering both long and short forms and correlating the sets of scores. The degree of relationship denotes the accuracy with which a score on the 50-word test may be predicted from a score on the 25-word test. However, the grouped half-list scores form a quantity common to both variables being correlated, and for this reason, r is usually positive and high. Another way in which half-list discrimination tests may be evaluated is with reference to stability. The present study was designed to determine whether grouped half-list measurements are as stable as those of full-lists. Nine CID W-22 Auditory Tests were administered to 581 adult males. Disc-recorded tests were employed exclusively and only better ear results were used. The raw data were (a) number of words missed out of the first 25 words, (b) number missed out of the second 25 words, and (c), total number missed. There were, thus, three estimates of discrimination ability for every patient: two based on half-lists and one based on a full-list. The null hypothesis was applied to the difference between standard deviations of half-list and full-list scores generated by patients subjected to identical tests. For the tests employed, the greatest difference between half-list and full-list was 2%. In all cases σ_σ was less than 2% and in most, less than 1%. In no instance did the half-list exceed the full-list. It was felt that the use of other tests and other groups of subjects would not alter the results appreciably. The basic conclusion was that half-lists, as defined in this study may be used as clinical tests of auditory discrimination.

The Effects of Frequency Distortion Upon the Intelligibility of Monosyllabic Word Lists and a Sample of Continuous Discourse. THOMAS G. GIOLAS, *University of Alabama*, and AUBRY EPSTEIN, *University of Pittsburgh*—This study was undertaken to investigate the relationship between monosyllabic word lists commonly employed to measure auditory discrimination ability and a sample of continuous discourse.

Specific lists from the PB 50 and W 22 Monosyllabic Word Lists and a sample of continuous discourse were presented to 175 normally hearing subjects under seven filtering conditions of distortion. The subjects were divided into seven groups of twenty-five; each group listening to all speech samples under one of the distortion conditions. One list from each series was presented in its commercially available form and compared to new recordings of comparable lists from each series, made using a single talker and controlling the monitoring and recording procedure. The continuous discourse employed was a fifteen minute lecture. The words were scored in terms of number of items correct; the discourse in terms of number of items correct on a test covering information presented. The following are the pertinent results and conditions: (1) Consistently higher scores were achieved with the W 22 word lists than with the PB 50 word lists, even when the influence of dissimilar recordings was eliminated. Such score differences were attributed to a combination of content differences and the monitoring procedure and fidelity of the Hughes sixteen-inch discs. (2) The effect of frequency distortion on the error pattern of the Hughes and Hirsh recordings is quite dissimilar, except when the effect of the dissimilar recordings was eliminated. Here the error pattern differed only in degree. (3) Monosyllabic word lists and continuous discourse are affected in the same way by frequency distortion, i.e., errors increase as distortion increases. (4) List differences, whether or not fidelity is considered, become greater as more distortion is introduced. (5) No accurate intelligibility score prediction for the continuous discourse may be made on the basis of scores obtained on the PB 50 and W 22 lists. (6) The error curves for the W 22 lists lie closer to the curve for continuous discourse than do the curves for the PB 50 word lists. List content is offered as a possible explanation for these differences. (7) The possibility of devising two phonetically balanced word lists differing in content as to word familiarity is offered as an approach for diagnostic and prognostic measures in clinical audiology. (This paper is based on a Ph.D. dissertation completed under the direction of Dr. Aubrey Epstein.)

Effects of Filtering Upon the Intelligibility of Words Varying in Familiarity. Elmer Owens, *University of California Medical Center, San Francisco*—Seven monosyllabic word lists were divided into two groups of two and one group of three. The lists of each group were matched phonetically and were varied systematically with respect to word familiarity, defined by frequency of usage according to the Lorge word count. After being recorded under seven conditions of distortion achieved by low-pass filtering, the seven lists were presented to 210 college students serving as listeners. The listeners were divided into seven groups of 30, each group listening to all seven lists under a single condition of distortion. A carrier phrase was employed and test words were presented only once, with no previous practice permitted. Lists characterized by greater familiarity, even to a slight degree, were significantly more intelligible. Findings were related to the PB-50 and W-22 intelligibility lists as follows: (a) Because of the greater over-all familiarity of the W-22's, better discrimination scores would be expected on them compared to the PB-50's, (b) Differences in over-all familiarity among word lists within each of the two series, but particularly among the PB-50's, would tend to produce variations in difficulty from list to list. (c) To the extent that discrimination scores purport to measure hearing acuity for phonetic elements of speech, the wide range in word familiarity on each of the lists in both series would have confounding effects. Several implications pertaining to possible refinement of standard intelligibility lists were considered: The familiarity of words on any test list should be controlled, preferably on the basis of usage frequency according to an accepted word count. All words on a particular list should be from the same narrow frequency-of-usage band, the selection of which would depend upon the level of difficulty desired. Contextual words should be omitted, as should words of usage frequency higher than 2,000 on the Lorge count. (Research for the paper was done at the University of Pittsburgh, under the direction of Aubrey Epstein, Ph. D., in partial fulfillment of the requirements for the Ph.D. degree.)

The Effect of Two Types of Distortion on Word Intelligibility. S. Zerlin and E. D. Burnett, *VA, Washington D. C.*—Among the electroacoustic factors which are felt to affect hearing aid performance are harmonic and intermodulation distortions. If present in the hearing aid, these distortions contribute to the speech signal frequency components which were not originally present at the microphone. A quantitative estimate of the effects of these distortions on speech intelligibility has been lacking, however. In an attempt to supply this estimate, a distortion generator developed by the National Bureau of Standards was used which produced only intermodulation and harmonic products. Specified amounts of these combined distortions were introduced into recorded versions of four of the Lehiste-Peterson PB lists (J.A.S.A., Vol. 31, 1959, p. 280). Four degrees of distortion were employed: 0%, 30%, 50% and 100%. The lists were presented at approximately 40 db above SRT, and the effects of these levels of distortion on word intelligibility were then noted. Subjects used in this study ranged from those having essentially conductive losses to those with rather severe sensorineural involvements. Those with fairly pure conductive loss exhibited practically no decrease in their intelligibility scores until distortion became severe (100%). Subjects with sensorineural involvement began showing deterioration of intelligibility score at lower degrees of distortion, and gave progressively poorer performances as the degree of distortion increased. Further, for a given degree of distortion, it was found that, if the hearing loss was represented as the audiometric bond conduction average for the speech range frequencies, a fairly predictable relation could be shown to exist between this three frequency bone average and the intelligibility score.

S9—MEDICAL ASPECTS OF AUDIOLOGY

Ototoxicity of Dihydrodesoxystreptomycin. G. Levine, *University of Colorado*, R. S. Mitchell, *University of Colorado Medical School* and A. B. Organick, *Brooke Army Hospital*—The general purpose of this study was to determine the frequency and degree of ototoxicity from daily administration of 1.0 gram of dihydrodesoxystreptomycin (DDSM). Ten patients hospitalized at Denver General Hospital with advanced active pulmonary tuberculosis for whom daily streptomycin was indicated as part of an antituberculosis regimen were selected for this study. Duration of treatment varied among patients, from one and a half months to seven and a half months depending on clinical findings during the course of treatment. Each subject was studied audiologically and otologically prior to treatment and at two week intervals during the treatment with DDSM. Whenever possible audiologic study continued at monthly intervals after treatment ended. Five patients showed no change in hearing during the two and one-half to six months DDSM was given. In two of these patients in which it was possible to conduct post-treatment studies, hearing remained unchanged up to four and one-half months after cessation of the DDSM drug. The remaining five patients showed changes in hearing of the sensori-neural type judging from the superimposed air and bone conduction audiometric configuration. Jerger's SISI test was administered to four of these patients and as a result of the high scores obtained in the region of the threshold shift, cochlear damage was suspected. In all cases where shifts in pure tone thresholds were demonstrated, only the high frequency tones above 1500 cps were involved. The onset of acuity changes varied from two weeks to six months after the first dose of DDSM. The changes in hearing took various forms. In two cases unilateral hearing loss involving the right ear occured, while the other three patients suffered bilateral involvements. In the two cases in which we were able to continue audiometric study after the use of DDSM was discontinued, deterioration of hearing continued in the high frequencies. In all instances where changes in hearing

was observable during or after DDSM treatment, the degree of hearing loss which occurred relative to the baseline audiometric study did not exceed 35 db at any frequency. From the results of this study on a limited number of hospitalized patients, it was concluded that DDSM is ototoxic. (This study was supported in part by a grant from Eli Lilly Drug Company.)

The Response of Certain Sensory-Neural Hearing Losses to Vasodilator Drugs. JAMES L. SHEEHY, *Los Angeles, California*—Sudden and fluctuating sensory-neural hearing losses of obscure origin have been thought to be due to viral infection, neuronitis, or disturbances of the vascular bed of the inner ear. If due to viral infection or neuronitis, then treatment of any type will be unlikely to result in return of hearing. If due to a vascular bed disturbance, treatment should be effective if vascular spasm, rather than hemorrhage or thrombosis, is the cause, and if treatment is initiated before irreversible changes take place. The clinical findings in a large group of individuals with sudden and fluctuating sensory-neural hearing losses will be presented. Intensive vasodilator therapy has resulted in the restoration of hearing in approximately 50 per cent to those treated within six weeks of the onset of the hearing loss. (From the Otologic Medical Group and the Department of Otolaryngology, University of California School of Medicine. Sponsored by the Los Angeles Foundation of Otology, Aram Glorig, M. D. Research Director.)

Audiologic Findings in 73 Severe Poliomyelitis Patients. FREEMAN E. MCCONNELL, *The Bill Wilkerson Hearing and Speech Center,* and RANDOLPH O. BATSON, *Vanderbilt University School of Medicine*—Disturbance of the special senses is rarely described as being associated with poliomyelitis. Audiologic evaluation of 73 patients following severe poliomyelitis revealed, however, a mild depression of hearing acuity in more than 90 per cent of the cases. All patients were extensively paralyzed, had moderate to severe degrees of respiratory failure, and the great majority had been disabled for several months. The recurrent pattern in almost all of the audiograms was one in which both air conduction and bone conduction pure tone thresholds were equally depressed at comparable levels for the frequencies from 125 through 2000 cps. with the curve rising at the two higher octaves, approaching normal threshold level at 8000 cps. Repeat tests three months or more after the first audiologic assessment on approximately one-fourth of the subjects indicated no essential change in hearing level as obtained initially. Duration of disability from poliomyelitis and extent of paralysis appeared to have no significant correlation with the discrepancy in hearing acuity. A significant relation was observed, however, between loss in vital capacity and amount of deviation from normal hearing level. The uniformity of the audiogram pattern and the bilateral consistency suggest central damage to the auditory mechanism in these patients as an etiologic factor consistent with the poliomyelitis condition. (This study was aided by an annual grant from the National Foundation.)

Does Finger Surgery Improve Hearing Level? JACK A. WILLEFORD, *Bill Wilkerson Hearing and Speech Center*—The value of finger surgery in restoring hearing acuity has been debated for some time. Medical specialists discount the validity of such a procedure. However, a widely known osteopath contends that, through finger surgery, he is able to restore a substantial degree of acuity. His claim is made for both conductive and some sensori-neural impairments. To resolve this seeming controversy, the author obtained audiograms on several deaf children prior to, and following, finger surgery by the osteopath in question. Results showed essentially no change in hearing levels. If any change was evident, it was in the direction of poorer acuity. This finding was in sharp constrast to the surgeon's audiometric results which were given to the yougsters' parents. The latter audiograms showed substantial improvements in hearing level. Parents steadfastly maintained that each of the children was actually hearing better following surgery, and that friends of the family would confirm this contention. Possible reasons for such an impression will be discussed along with other details of interest.

The Role of Audiology in Surgery for the Relief of Deafness—Present Status. MOE BERGMAN, SAMUEL ROSEN, JOHN GUERRIERO, *Hunter College and Mt. Sinai Hospital, N. Y.*—Increasing numbers of audiologists are associated with the audio-surgical aspects of the rehabilitation of deafness. They are involved in (a) the selection of cases and other *presurgical* activities, (b) the *presurgical* audiologic monitoring of the effects of various operative maneuvers as a guide for the surgeon, and (c) the *postsurgical* evaluation of results and planning for follow-up measures. Through the direct observation of the middle ear during surgery much is being learned about the meaning of tests of hearing which attempt to differentiate middle ear from inner ear involvement. The audiologic results of remobilization of the stapes, of the fenestration of the oval window or of the replacement of part or all of the stapes by autogenous or by prosthetic materials suggest the need for revision of previous criteria for case selection, particularly in apparent "mixed" deafness. Some surgeons employ presurgical audiometry routinely, others do not. In our experience such testing is often useful but the results must be interpreted with caution in each case, since they may indicate hearing improvement which will not be present post-operatively, or they may fail to show a favorable result at times when the experienced surgeon can correctly predict post-surgical hearing improvement. Test results are also found to be disturbingly variable in those cases in which there is active bleeding in the middle ear during the test. The post-operative evaluation of results of the surgery must include total planning for rehabilitation. Since present surgical techniques for the relief of deafness for otosclerosis only infrequently bring about the restoration of bilaterally normal hearing, the need for audiological follow-up is of great importance, particularly if no further surgery is planned. This follow-up is too often neglected by both surgeons and audiologists, leaving many patients with residual communication handicaps to which the audiologist must give his positive attention.

S10—SPEECH THERAPY AND SPEECH IMPROVEMENT IN THE PUBLIC SCHOOLS: RECENT STUDIES.

Attitudes of Classroom Teachers Toward Children with Speech Handicaps. SIDNEY GODA, *Johnstone Training and Research Center, Bordentown, New Jersey*—This study will report the findings and implications of a five-item questionnaire which was designed to measure classroom teacher attitudes to children with speech handicaps. Five questions were asked of teachers in northeast Texas: (1) What do you think are the cause or causes of speech defects in children? (2) Do you think there is any difference between the behavior of a child with a speech defect and a child with normal speech? Always; Nearly Always; Occasionally; Rarely; Never. (3) Do you give any extra help to the child in your room with a speech defect? Yes; No. (4) If you have answered yes to the previous question, please describe the kind of help you give the child, and (5) Do you feel competent in helping children with speech defects in your classroom? Yes; No; Undecided. A total of 152 classroom teachers completed this questionnaire, including 30 secondary teachers and 120 elementary school teachers. No teacher had taught less than five years. None of the teachers reported ever having had a course in speech therapy. Some of the findings include the following: (1) A total number of 380 causes were listed, with an average listing of 215 causes per teacher. Physical and environmental factors consitituted 86% of the total. (2) One-third of the teachers reported that there was always or nearly always a difference between the child with a speech defect and a child with normal speech. (3) Over one-half of the teachers do not give extra help to the child with a speech defect. The chief reasons given for not offering extra help are (a) lack of knowledge, (b) fear of

causing the child to feel self-conscious, and (c) lack of time. (4) Of the teachers who offered extra help to the child, the majority used the following two techniques: (a) talking to the child, and (b) creative dramatics or choral speaking.

The Use of Dual Channel Tape Recording in Speech Therapy in School and Clinic Situations. R. HENRICKS, *University of Maryland*—This paper is a review of a series of experiments with prerecorded tape stimuli for use in speech therapy. The experiments were carried on at the University of Maryland Speech Clinic, Walter Reed Hospital, the Prince George's County Schools and the Lanham Easter Seal Treatment Center. The principle problem to be discussed is the usefulness of this type of equipment in various types of situations, and with various types of cases. Over 100 subjects were tested with this equipment, and records were kept pertaining to therapist's evaluations of subject's behavior. Conclusions at this point are that the amount of therapy time, in most cases, can be easily doubled demanding only little extra time on the part of the therapist, since the equipment can be operated by the patient himself.

An Empirical Investigation of Speech Improvement in the Elementary School. KATHARINE BUTLER, *Kalamazoo Public Schools*—The public school therapist often wonders if the so-called "minor" speech defects can be corrected through a speech improvement program, and, if so, what kind of program and what amount of time will be necessary to implement the program. This study involved 353 kindergarten children in five schools of a 7,000 population school district. Nine experimental groups and five control groups were chosen and articulation examinations preceding and following a year-long program were administered to the total of fourteen kindergarten groups. This program was built around the goals outlined in the text *Speech for the Elementary Classroom*, co-authored with Charles Van Riper. The results showed that the experimental groups averaged 47% corrected; the control group, 25%. Minimal time devoted to speech in the classroom was one thirty minute session per week for one semester, or one 15 minute session per week for two semesters.

Criteria for the Evaluation of Public School Programs of Speech and Hearing Therapy. JESSE J. VILLARREAL, *University of Texas* and DON HAMMILL, *Deer Park, Texas, Public Schools*—The largest segment of activity in speech and hearing therapy in this country operates in the setting of the public schools. A set of usable criteria that permits the evaluation of specific programs, either in the light of average practices or ideal standards, should be useful. The present study was undertaken when a search of the literature did not produce such a set of criteria. A set of eight criteria are proposed, as follows: (1) adequate professional training and competence of therapy personnel; (2) adequate procedures for the identification of speech and hearing problems; (3) availability of therapy for all who need it; (4) presence of characteristics necessary to permit the program to function efficiently, such as (a) case loads of manageable size, (b) physical conveniences including equipment and space, and (c) adequate facilities for securing assistance in diagnosis and complementary treatment; (5) evidence to show that the therapy administered is effective, such as (a) a sufficiently high dismissal rate, and (b) evidence of improvement by objective measuring instruments; (6) flexibility in the structuring of the program of speech and hearing therapy to permit experimentation with promising new procedures and a variety of approaches in providing speech and hearing therapy for the individual child; (7) employment of an adequate system of accounting to permit the accumulation and sharing of information about the individual case, and to guide the direction of therapy; and (8) an effective program of cooperation, planning, communication, and counseling with parents, classroom teachers, and interested school personnel. These criteria have been used in the evaluation of a specific program of speech and hearing therapy in the Deer Park Public Schools, and have been found workable.

S11—COMMUNICATION PROBLEMS OF THE MENTALLY RETARDED: THE PARSONS PROJECT IN LANGUAGE AND COMMUNICATION OF INSTITUTIONALIZED MENTALLY RETARDED CHILDREN I.

Establishing the Research Setting. RICHARD L. SCHIEFELBUSCH, *University of Kansas*—The paper describes the initial rationale which motivated the planners of the Parsons Project in Language and Communication. It also narrates the steps through which the project planners moved in developing the research setting, both in regard to the contriving of a research milieu and in regard to the constructs formulated by the research team to guide the development of research studies. Since research in language and communication does not fall within any one discipline and since the team members represent the disciplines of speech pathology, social and clinical psychology, and educational psychology, attention is given to the staff problems of communicating about communication. Attention is also given to the problems attendant to the location of the project in a resident center for mentally retarded and emotionally disturbed children apart from the sponsoring university research agency. The paper further explains that the project is a series of studies each intended to contribute to the description of communication behavior or to plans for improving it. As a focus of attention the Project Staff has centered on the interpersonal variables of the environmental setting. An implicit assumption has been that the slower developing child—with or without organic damage—may be subjected to interpersonal processes which tend to perpetuate a low level of behavioral functioning, particularly verbal behavior. Finally, since the paper is introductory to four other papers descriptive of specific studies conducted by the Parsons Staff, it is essentially an overview. It is intended to introduce briefly the research framework, the pilot studies and the empirical studies in progress or completed. The primary purpose of the paper, then, is to introduce the audience to the Parsons Project and to indicate the flavor of the work in process there, much of which will be described in careful detail in the following panel papers.

A Behavioral Approach to Research in Language and Communication. J. E. SPRADLIN, *University of Kansas*—Language and communication research is discussed from the point of view of descriptive behaviorism. The approach is based on two fundamental premises: First, language and communication refer to responses that can be observed, classified, and measured objectively; second the conditions or variables which determine language responses can be objectively described, and, in many cases can be manipulated. Such an approach is in line with the concepts of such behavior theorists as B. F. Skinner, N. E. Miller, and J. R. Kantor. The concepts and principles of modern learning theory have served as a rationale for language test construction and have been a source of experimental hypotheses. Some learning concepts which have been useful in understanding language and communication are: (1) Instrumental or operant response, (2) reinforcement or reward, (3) response differentiation or response shaping, (4) response chaining, and (5) stimulus discrimination. The paper describes laboratory language learning experiments and initial work in test development based on a descriptive learning approach.

An Interpersonal Approach to Language Behavior. GERALD M. SIEGEL, *University of Kansas*—An interpersonal approach to language suggests that language events are meaningfully studied as interactive processes occurring between two or more persons. Within the *Parsons Project in Language and Communication of Retarded Children* this approach has been translated primarily into the investigation of language behavior as a "two-person" system. While this is not the only useful method for studying verbal behavior and is not entirely novel to speech pathology, it would appear to offer some methodological and theoretical directions that have not otherwise been fully explored. In any situation, for example, in which two or more persons are assembled, even where one is "subject" and the other "experimenter," the nature of the assembly itself may affect the be-

havior of each of the individuals. This may be true in a testing situation where characteristics of the child may influence the manner in which items are presented or in studies in which some treatment method is mediated by an adult. Studies which involve an experimenter interacting with subjects require adequate accounting for the behavior of the experimenter as well as that of the subjects. The effects of the "other person" in a language situation have been the focus of a number of investigations within the Parsons Project. An underlying hypothesis has been that retarded children may evoke from adults the kinds of verbal responses that will, in turn, tend to perpetuate the retarded language performance of the children. An initial series of studies has been directed towards ascertaining the effects of verbal level of children on the language behavior of adults. In a pilot study Spradlin and Rosenberg found that when adults are asked to interview children dichotomized on the basis of verbal performance there is considerable individual difference among adults, but there is a tendency for adults to ask proportionately more questions of "low" verbal children than "high" verbalizers. Children were dichotomized on the basis of the Parsons Language Sample. In a pilot study recently completed by Siegel, each of four adults was assigned four children, two "high" verbals (on the basis of PLS and an articulation measure) and two "low" verbalizers. The hypothesis being tested was, again, that language behavior of adults is responsive to the verbal level of the children. These data are currently being analyzed. Assembly studies have also been designed involving only children. Rosenberg, Mabel and Spradlin assembled high and low verbal children into two-person groups in which both members of the group were either of the same or different verbal levels. The results of both a pilot study and a replication indicate that the verbal behavior of children tends to increase when they are assembled with other children of similar verbal level. Interestingly, this was true of both low and high level children indicating that even children with severe language retardation are amenable to the influences of a social setting.

The Effects of Verbal Reinforcement on the Language Behavior of Mentally Retarded Children. DOROLYN EZELL, *University of Kansas*—The purpose of this study was to investigate three methods of increasing the amount and complexity of the verbal behavior of institutionalized mentally retarded children. Psychiatric aides were used as the language "therapists." The subjects were thirty-six children between 9 and 12 years of age who made verbal scores on the Parsons Language Sample below the 40th percentile of the institutional population. The experimental treatments were: (1) Reinforcement, (2) Bombardment and (3) Control. In *reinforcement* aides were instructed not to initiate communication with the children but to respond to each vocal response of a child by imitating the vocal response or by praising the child. Previous observation had indicated that these two types of responses, if made by an adult, tended to increase the frequency of children's vocal responses and thus could be classed as empirical reinforcers. In the *bombardment* method aides were instructed to stimulate the children to vocalize by talking to children in short sentences. The aides were also instructed to imitate or praise the child whenever he made a vocal response. Thus, the condition is characterized by the adult both setting the conditions for the child's response and reinforcing the child once the response occurs. Aides in the *control* group were instructed to encourage the children to vocalize and communicate. They were told to use whatever techniques they found effective. Six psychiatric aides were used as language "therapists." Two aides were assigned randomly to each treatment. Each aide met with two groups of three children five times each week for a period of 20 weeks. Changes in amount and complexity of the children's verbal responses were determined by observer ratings during the "therapeutic" sessions and by changes in scores on the Parsons Language Sample. Observers rated or recorded the children's vocal behavior during the sessions according to a three category system: Noise (inarticulate sounds), one word articulate responses, and multiple word articulate responses. The vocal behavior of aides was rated by observers from tape recordings of the sessions according to a five category system: Imitation, praise, reprimand, question, statement and one word responses.

S-12—AUDIOLOGIC MEASURES IN MIDDLE EAR SURGERY.

Bone Conduction Changes in Otosclerosis Following Stapes Mobilization. A. S. FELDMAN, *State University of N. Y. Upstate Medical Center* and C. E. RUBEN, *Winthrop Foundation, Mass. Eye & Ear Infirmary*—Several investigations have been reported which consistently revealed very significant changes in bone conduction thresholds following fenestration surgery. The extent of the change in many instances was sufficient to return the bone conduction threshold to a normal level. Some recent reports have not substantiated this finding following stapes mobilization. The current report is based upon an examination of preoperative and postoperative bone conduction thresholds of more than 250 ears in which stapes mobilization was the surgery performed. Subjects were grouped according to the success of surgery. The data implies that the bone conduction changes generally observed in patients having a successful fenestration is not usually found in successful mobilization. In those instances where the air-bone gap is completely alleviated the bone conduction thresholds do improve, but whenever there is a residual air-bone gap such is not the case. This may be interpreted on the basis of a still greater than normal impedence or increased stiffness in the mechanical system which functions to produce a mechanical shift in bone conduction. These findings have definite implications relative to postoperative discrimination scores.

The Influence of Vein Plug Stapedioplasty on Bone Conduction Acuity. ERNEST L. BOYER and C. M. KOS, *State University of Iowa Hospitals*—A significant milestone in surgery for otosclerosis was reached when Stapedectomy was introduced. This procedure removes the entire stapes and replaces it with a prosthesis that creates a firm link between the oval window and the remainder of the ossicular chain. A renewed interest in the influence of otosclerotic surgery upon bone conduction acuity has accompanied the advent of Stapedectomy. Two basic questions emerge: (1) "Are the norms now being used by audiologists to predict postoperative bone conduction thresholds appropriate to this new procedure?" (2) "Is the direct approach to the vestibular area traumatic, resulting in cochlear acuity?" One hundred consecutive Stapedectomies were accomplished at University Hospital beween May and December, 1959. An improved technique known as Vein Plug Stapedioplasty was employed. A section of vein taken from the back of the hand is secured by a simple knot to a length of stainless steel suture wire. The resulting prosthetic stapes (vein plug) is inserted into the exposed oval window niche with the distal end of the wire looped over the long process of the incus. Pure tone air conduction threshold were taken by an audiologist preoperatively and at regular intervals postoperatively. Preoperative and six to eighteen weeks postoperative audiometric measurements were tabulated. Threshold shifts were noted and tested for statistical significance. 90% of the 100 surgical cases resulted in a closure of the air bone gap and 86% of these successes achieved hearing improvement of better than 30 db in the speech range. There was improvement in the bone conductıcn thresholds at 1000 and 2000 cps approximating 5 db. No significant shift occurred at 500 cps. In surgery for otosclerosis employing Stapedectomy procedures it would seem inappropriate to predict bone conduction shifts of greater magnitude and at frequencies other than those indicated above. The suggestion that Stapedectomy is a traumatic procedure that would reflect itself in a loss in bone conduction acuity is unsupported by these data.

Bone Conduction Measurements Following Fenestration and Stapes Mobilization Surgery. MAURICE H. MILLER, *Kings County Hospital Center, Brooklyn,* JACQUELINE RENDALL, *Catholic University,* and MORRIS KALMON, *Akron, Ohio*—The pre and postoperative bone conduction thresholds of a series of patients with an otological diagnosis of otoclerosis are analyzed. These patients showed improvement in hearing following either the fenestration or stapes mobilization operation, as defined by an increase in the postoperative pure tone average for the speech frequency range of more than 10 db. Patients in both the fenestration and mobilization groups were evaluated audiometrically in the same Audiology facility. Calibrated conduction oscillators were used to obtain bone conduction thresholds at 250, 500, 1000, 2000, and 4000 cps. The mean bone conduction shifts for the fenestration group (68 cases) were as follows: 250 cycles: 1.40 db., 500 cps: 3.30 db, 1000 cps: 7.57 db, 2000 cycles: 6.84 db, 4000 cps: 0.29 db. The mean bone conduction shifts for the stapes mobilization group (32 cases) were as follows: 250 cps: 1.25 db, 500 cps: 0 db, 1000 cps: 4.53 db, 2000 cps: 3.13 db, 4000 cps: 3.59 db. The percentage distribution of individuals in the two groups according to the amount of shift at each frequency is shown. The air and bone conduction shifts on the unoperated ear of patients in each group are also analyzed. With conventional audiologic instrumentation and procedures, it is extremely difficult and, in some cases, impossible to determine valid bone conduction measurements of the nonlateralized ear (ear with a smaller air-bone gap) in cases of conduction hearing impairment. This presently unsolved problem in bone conduction audiometry affects the results of the present and similar studies. The application of bone conduction shifts to the selection of suitable cases for surgery and in the prediction of postoperative results is evaluated in terms of difficulties involved in isolating the two ears for bone conduction measurements. Conventional audiologic procedures, other than bone conduction testing, should be utilized whenever possible to determine the cochlear reserve of the nonlateralized ear. Research is necessary to develop new diagnostic tools which will make possible the accurate determination of sensori-neural function in these cases without recourse to bone conduction measurements.

Audiometric Studies on a Series of Patients with Vein Graft Stapedioplasty. L. D. HEDGCOCK, H. L. WILLIAMS, K. M. SIMONTON, and T. S. GRIFFING, *Mayo Clinic and Mayo Foundation, Rochester, Minn.*—This report presents and discusses the pre and postoperative audiometric findings in a consecutive series of patients who underwent vein graft stapedioplasty at the Mayo Clinic. Prior to surgery each patient was examined and classified as an A, B or C candidate according to his suitability for the procedure. Among the patients who were considered highly and quite favorable (A and B) candidates, most showed a substantial postoperative improvement in hearing. In the less favorable (C) group, many also experienced excellent or satisfactory improvement. In some instances the air-bone gap was completely eliminated and in most others a substantial air-bone closure was achieved. In rare instances the hearing failed to improve or become worse following surgery. A few patients experienced an early gain in hearing followed by partial to severe regression. In most cases where regression occurred, the hearing still remained better than the preoperative level. Significant changes were observed in many of the postoperative bone-conduction thresholds when compared to the preoperative levels. These shifts varied from tone to tone and from ear to ear and did not fit into any precise pattern, although they are somewhat suggestive of the principle on which the Carhart notch is based. It is assumed that for the most part they represent mechanical shifts due to physical changes in the vibrating system. In certain instances reduced acuity for high frequencies is judged to be the result of surgical trauma. Serial audiograms were made over a period of 8 months, when circumstances permitted, in an attempt to find the time of optimal improvement. The results presently suggest that improvement is likely to reach the optimal level by the sixth week after surgery. Although there is yet no certainty of the duration of results of this procedure, the evidence, based on the most recent tests, suggests that where favorable results are obtained, they may be expected to continue.

S13—CONTRIBUTED PAPERS ON THE STUDY OF ARTICULATION PROBLEMS.

The Nature and Frequency of Misarticulation Related to the Method of Eliciting Speech. W. D. WOLFE, *Indiana University*—The purpose of this study was to measure and compare the articulation responses of children during conversational speech and oral reading. The tape recorded speech of 26 junior high school children with defective articulation provided the data for this study. Each of the 26 subjects had made two tape recordings under two experimental conditions: one designed to provide a sample of articulation during conversational speech and the other to provide a sample of articulation during oral reading. Comparisons were made of consonant sounds that occurred in the same grammatical and phonetic contexts in both the speech and oral reading samples. Differences in articulation between the two conditions were measured linearly by the number and type of misarticulations observed. Insofar as the study's data represent articulation behavior during a type of conversational speech and a type of oral reading the following conclusions were drawn: (1) Misarticulations in speech are nearly twice as frequent as in oral reading. (2) Sounds defective in the initial position during speech tended to be improved by oral reading to a greater degree than sounds in the medial and final positions. (3) The [l, k, ð, θ, ŋ, j, t, r, s, d] sounds were influenced considerably by oral reading; the [r, s, d] sounds, however, tended to show more fluctuation between the two conditions than the other sounds in this group. (4) Sound positions which were misarticulated in both speech and oral reading tended to be produced with the same type of error more than half of the time. (5) Sounds in blends seemed to be improved less by oral reading than sounds preceded and/or followed by vowels. (6) Improved articulation in oral reading was not only more frequent than improvements in speech but the changes were also of greater magnitude. If the results of this study represent the differences between articulation during all types of conversational speech and oral reading, the use of oral reading as a means of assessing articulatory disorders must be viewed with skepticism; on the other hand, the use of these two means of eliciting responses should be of great therapeutic importance. (This study was completed as an MA thesis under the direction of Dr. Robert Milisen.)

Reliability of Articulation Responses of Kindergarten Children. H. WINITZ, *University of Kansas*—The reliability of repeated articulation responses by kindergarten children was tested under 3 different conditions. In the first condition a word list consisting of 40 test sounds, singles and blends, was prepared. The sounds, for the most part, were selected from Templin's 50-item screening test. Under the first condition 50 kindergarten children were randomly selected from two elementary schools in Lawrence, Kansas. Sampling was restricted to children considered to be physically normal and from monolingual homes. The subjects were administered two word lists. Each word list contained the same sounds in the same position, but in different test words. In both cases responses were elicited from picture cards. Both order of word list and order of test sounds were randomized independently for each child. Under the second condition 100 kindergarten children were randomly selected from four elementary schools in Topeka, Kansas. Sampling was restricted to children considered to be physically normal, to be from monolingual homes and to have normal hearing. The test sounds were elicited in response to pictures and in response to the examiner's production of the test sounds, (monitored by a sound level meter at approximately

65 db.). The examiner's face was covered by a silk screen. Both order of sound elicitation and test sounds were randomized independently for each child. Under the third condition 100 kindergarten children were randomly selected from two Lawrence, Kansas elementary schools. The criteria of selection was similar to condition one. The children were tested on two different occasions approximately one week apart. An analysis of the individual test sounds indicated that, in general, the different test conditions did not appear to influence the production (correct or incorrect) of the sounds tested.

The Use of Television to Overcome Dialectal Rhythm and Articulation Problems in Hawaii. MORTON J. GORDON, *University of Hawaii*—Educational television offers challenging opportunities for supplementing group remedial speech instruction, particularly in areas where many speakers have dialectal articulation problems stemming from wide spread bilingualism. Hawaii is one such place, where the language problems require a comprehensive public school speech improvement program. The investigator believed that the current elementary language arts program in speech improvement could be strengthened through: (1) a combined television-classroom program to improve learning, (2) new teaching materials to provide specific information on the sound and rhythm problems found in Hawaii, (3) instructional methods in speech improvement to help the classroom teachers fully utilize the materials, and (4) daily instruction with systematic lesson planning to counteract a tendency to present speech improvement only incidentally. The pilot study contained eighty-seven third grade pupils in nine experimental groups, and eighty-two third grade pupils in nine control groups. These students misarticulated [θ] and [ð] and came from five Honolulu public schools. A picture-reading test was administered in an orthodox manner of articulation testing, and the results, which were tape recorded, were evaluated by three staff members from the Department of Speech. The test was given before and after the study. The course lasted nine weeks and the experimental groups received a total of five, fifteen-minute speech classes each week. The investigator taught two of these weekly classes on television appearing on receivers placed in the classrooms. These classes simultaneously provided direct instruction for the children and demonstrated correct remedial techniques for the regular teachers. The remaining three weekly classes were conducted by the regular teachers. The experimental classroom teachers followed a preplanned schedule of lessons using a special workbook and two supplementary elementary speech improvement texts. The pupils in the nine control groups followed whatever speech schedule was normal for their particular classes. No attempt was made to give them any special help. The following general result was found from the pilot study. The mean number of errors for the experimental group was 9.8 less than the control group's mean errors. This difference of 9.8 is statistically significant beyond the .001 level of confidence. The study demonstrated, in a limited fashion, that elementary school children with dialectal articulation defects could significantly improve their speech through a group television-classroom speech improvement program. Television may prove to be a valuable medium for supplementary speech improvement instruction, especially in areas where large numbers of speakers use substandard speech.

S14—CONTRIBUTED PAPERS ON STUTTERING.

A Technique Using Group Consensus in Adult Stuttering Therapy. COURTNEY STROMSTA, *The Ohio State University*—The object of the modified sociometric technique to be discussed in this paper is to provide a means whereby each member of a group can reappraise his self concept. It permits each member to become apprised of the consensus of the group with respect to their image of his characteristic behaviors and attitudes. Contributory opinions cannot be identified with individuals yet are known to originate with peers who share a background of stuttering. Rules for the technique prescribe (a) that all members ask an equal number of questions based on such topics as modification of stuttering, use of defense mechanisms, participation in the group, fulfillment of assignments, etc., (b) that each question be phrased so that the name of any member may serve as a response, and (c) that each member name a fellow member on an answer form in response to each question. The procedure is administered twice during a twelve-week therapy period at the end of the fifth and tenth weeks. It is initiated by the therapist who supplies an illustrative question, e.g., Who had the most secondary symptoms at the start of therapy? The therapist does not participate in the procedure yet controls who is to be included as well as the suitability of questions. The unsigned answer forms when tallied provide results that may be used in two ways: (a) To each member is presented individually only those results relevant to him, or (b) the results are posted for group inspection. In part, results based on clinical evaluations and questionnaires seem to indicate that (1) effected change is reinforced by a positive consensus, (2) change is effected by a negative consensus, (3) the technique serves as an impetus to group, individual, and self therapy, and (4) approximately 10% of the stutterers subjected to the technique over a two-year period felt that it had little or no effect. Limitations and cautions to be observed in the use of the technique are discussed.

Building a Therapy Program for Children Stutterers. C. CORDELIA BRONG, *Louisiana State University*—In the literature theories and therapies for adult stutterers are well represented. What to do with child stutterers is still a problem that receives far too little attention. Points of view range from a complete hands-off policy, through indirect assistance to the child by means of parent counseling, to complete coordinated programming. This is an era of "authorities," but views of authorities differ. The purpose of this paper is an attempt to integrate the best thinking of today that has significance in building a program for stuttering children, ages 4 to 14 years. This is done by presenting a series of hypotheses derived from selected theories, experimentation, and clinical observation, and suggesting appropriate goals and accompanying procedures that may be developed. Such a program has been evolving at L. S. U. during the past seven years.

Relationship Disturbance as a Cause and Consequence of Stuttering: An Hypothesis. MARYJANE REES, *Sacramento State College*—Based on the proposition that oral communication constitutes a dynamic inter-personal relationship between two people, it becomes evident, *a priori*, that a disturbance of interpersonal relationships would be reflected in oral communication as well as the reverse. A comprehensive hypothesis of stuttering behavior is that it reflects these two processes: that there is first a relationship disturbance and that, secondly, the feedback from this relationship creates additional problems which because of their readily identifiable nature have tended to obscure the more fundamental problem in the eyes of both client and therapist. Theories of stuttering behavior positing the cause of stuttering to be anxiety about stuttering *per se* and therapies directed at speech itself are addressed to the consequence of stuttering rather than to those conditions which would be more likely to result in stuttering behavior in the first place. Reflection on language development in the child indicates that language eventually replaces physical contact as a means of obtaining satisfaction for many and varied needs and as a means for controlling other persons and of being controlled in return. It seems reasonable to assume that if the early nonverbal experiences have been satisfying and reassuring, the child will expect similar satisfaction and assurance when his contacts are made through language. The language is likely to be straightforward and confident. If, however, these experiences have been punishing and tension provoking his contacts made through language are likely to be hesitant, anxious, tense, and hurried—in short, stuttered. Examination of child rearing practices in our society gives ample evidence of forces which interfere with the development of self-confidence.

In our culture the restrictions imposed on children are multitudinous and complex. Evidence based on studies of parents of children who stutter shows little that differentiates them from parents of children who do not stutter. These data have been gathered independent of the specific needs and characteristics of individual children. They do not show the interaction between a given child and his parents. Furthermore, the methods and instruments used are not sufficiently subtle to elicit the kind of information that is likely to lead to a better understanding of parent-child relationships which result in stuttering behavior.

"Stuttering" on the Trumpet. ROBERT W. BLAKELY. *University of Oregon Medical School*—This is a case report of a twenty-three year old University student who was referred to the author by a psychiatrist because of "stuttering on the trumpet." The student, aspiring to be a professional musician, reported that his "tongue got stuck" in the mouth-piece and could not be withdrawn. The difficulty seemed to occur in "pressure" situations note unlike those reported by stutterers. Techniques of avoidance were well developed e.g., substitution of back-of-tongue attack for tongue-tip attack. Two other musical instruments, not involving the mouth were played with no difficulty. The student's speech was hesitant and staccato but he had never been labeled a stutterer nor did the student think of himself as a stutterer. He did, however, feel inferior as a speaker. The student responded to habilitation methods generally applied to stutterers by speech clinicians. He was terminated because of summer vacation after nine one-hour sessions extending over an eight-week period. No follow-up has been possible by this writer. It is doubtful that gains made and "confidence" obtained by the student were lasting.

Stuttering Adaptation: A Clinical Paradigm. BURL B. GRAY and EUGENE J. BRUTTEN, *Southern Illinois University*—The adaptation effect refers to the behavioral finding that, all things being equal, stuttering responses decrease as a negatively accelerating function of massed readings. The lawfulness of this behavioral decrement led to the consideration of adaptation as a therapeutic model. Further investigations of adaptational behavior pointed up the role of specific word cues, indicative of previous stuttering, in precipitating moments of stuttering. On this basis, a study was instituted to determine if blackout removal of previously stuttered words affected the decremental course of adaptation. Though the removal of words previously stuttered resulted in a significantly greater frequency reduction than in the nonblackout trials, it was apparent that the blackouts were cues which increased adjacent stuttering and inhibited the decremental slope. The purpose of this investigation was to determine the extent to which removal of previously stuttered words affected adaptation and adjacency by comparison with an analogue of the blackout procedure. Twenty subjects read two matched lists of words embossed on individual cards and placed on a display board. In the control condition, the completion of each reading was followed by the reversal, to the blank yellow side, of all word cards on which stuttering had occurred. In the counter-balanced experimental condition, the word cards were placed in an unstructured spatial pattern. Following each reading the words stuttered were removed and the spatial pattern modified. In both conditions the order of the remaining words was held constant and the subjects were visually unaware of the word removal. The results of this investigation revealed that both conditions resulted in a significant adaptation. Statistical analysis of the between condition decrement indicated, however, a significantly greater trial by trial frequency reduction in the experimental condition. Furthermore, a between condition comparison of adjacency revealed a similar difference which approached significance.

S16—SPEECH AND HEARING OF FOREIGN STUDENTS III.

A Factor-Analytic Study of Language Learning Ability. PAUL PINSLEUR, ROBERT P. STOCKWELL and ANDREW J. COMREY, *University of California, Los Angeles*—The overall purpose of the study is to isolate a small number of factors with which to (1) predict students' probable success in (a) written and (b) oral aspects of foreign language study, and (2) diagnose the causes of failure in problem language learners. Twenty-three variables were factor-analyzed, using a principal axes solution and a Carroll oblique rotation. The calculations were performed on the IBM 709. The subjects were 208 elementary French students at the University of California, Los Angeles. The following factors found were: (1) Verbal knowledge. (2) (?), a factor showing that *older male* students had received better marks in high school language courses than had younger female students. (3) Ideational Fluency, which is the ability to make up rhymes, synonyms, or paraphrases under time pressure. (4) Bi-lingualism, a factor which tended to show that those who have had close contact with a foreign language at home do better in college French. (5) Speed of articulation, which is the ability to read words in English at a rapid rate. (6) Analytic Reasoning. The criteria used were two. First, teacher grades in a second semester French course. Secondly, grades on a test of the students' ability to speak French at the end of the second semester of instruction. Factors (1) and (4) had high loadings on both criteria. Factor (5) had a high loading on the second criterion. A follow-up study is already under way in which new variables will be used, and previous ones retested.

Orthographic Representations of English Pronunciation as an Aid in Teaching ILA. HERBERT J. OYER, *The Ohio State University* and HENRY M. MOSER, *The Ohio State University*—Specially devised orthographies in Chinese, Dutch, French, German, Italian, Japanese, Korean, Spanish, and Thai were constructed for a list of common English aviation words as an aid to their pronunciation by foreign nationals. Those prepared for German, Japanese, and Spanish were employed with native speakers of these three languages at the Air Force Language School, Lackland A F B, Texas. It was found that for each of these three groups, the specially designed orthographies, with or without the additional aid of auditory stimulation, resulted in significantly more intelligible pronunciations than the reading of these aviation words from only a printed list. In addition, each individual speaker in this study improved the intelligibility of his pronunciations when aided by the appropriate orthography. The comparative value of orthography alone vs. orthography plus auditory stimulation would make a distinguishable difference in the air traffic communication setting. (This research was supported by USAF Contract No. 19 (604)-4575.)

Comparative Study of Bilinguals and Monolinguals in Language Learning (Micro-utterance-association Learning). LOUIS LEREA and SUZANNE KOHUT, *Northern Illinois University*—This experiment attempts to study bilingualism as an environmental factor affecting language learning (micro-utterance-association, MU-A). The investigation concerns itself with the following questions: (1) Does an appreciable difference exist in the language learning facility (MU-A) of monolinguals and bilinguals? (2) What relationship exists between social adjustment and language learning facility (MU-A) of the monolinguals and bilinguals? (3) What relationship exists between intelligence and language learning facility (MU-A) of bilinguals and monolinguals?

Procedure

Two experimental groups, 30 bilinguals* and an equal number of monolinguals, matched in intelligence, chronological age, sex, and socioeconomic status participated in this study. During the experimental situation each subject was given the following battery: (1) Columbia Mental Maturity Scale; (2)Language exposure via memory drum and tape recorder; (3) Rogers' Scale for Personality Adjustment; (4) Language exposure for relearning.

*Extent of bilingualism was stringently controlled.

Findings

The findings of this investigation revealed that bilingual speakers learn the MU-A more rapidly than the monolingual speakers. The bilingual speakers also were able to relearn the MU-A after a period of structured activity more quickly than the monolingual speakers. The relationship between social maladjustment and the MU-A performances was not significant among monolingual and the bilingual groups. A significant correlation existed between speed of learning the MU-A and intelligence among the monolingual group; this relationship was not significant, however, among the bilinguals.

S17—COMMUNICATION PROBLEMS OF THE MENTALLY RETARDED II.

Symposium on Assessing and Developing Communicative Effectiveness in Mentally Retarded Children. LEON R. LASSERS and GORDON LOW, *San Francisco State College*—In recent years, speech therapy has concerned itself with speech difficulties as problems in communication, not just as problems in speech production. Concern has been shown for the improvement of language in speech therapy as well as of articulation, especially in the case of the mentally retarded. The goal of speech therapy has broadened to include improvement in communicative relationships as well as in the tools of communication. Consistent with these changing concepts concerning the purpose of speech therapy, new therapy techniques have been employed such as practice of articulation in useful communicative responses. At San Francisco State College a number of these new techniques, as well as conventional techniques, have been explored and combined in an eclectic therapy approach which is probably representative of the approaches currently employed by many speech therapists throughout the United States. Because of its emphasis on communicative aspects of speech and speech therapy, it has been called communication centered speech therapy. The effectiveness of communication centered speech therapy has been demonstrated clinically with children who present various types of speech problems including the mentally retarded. To support or refute this *clinical* evidence of the effectiveness of communication centered speech therapy with mentally retarded children, it was considered desirable to obtain *experimental* evidence of its effectiveness from a research investigation. Also recommending a research study was the apparent pessimism among those working in the field of mental retardation as to the usefulness of speech training for the mentally retarded and the fact that the results of most previous studies of speech training of mentally retarded children, even though encouraging, are difficult to interpret because of limitations in research design and evaluating instruments used. Major purposes of the investigation were: (1) to determine whether the speech of mentally retarded children can be improved through speech training; (2) to determine whether the speech proficiency of mentally retarded children can be more effectively improved with communication centered speech therapy than with conventional speech therapy; (3) to determine whether the degree of speech improvement of the educable mentally retarded (a) is greater than that of the severely mentally retarded, and (b) is a result of the two types of speech training used in the investigation; and (4) to develop a battery of evaluative instruments by means of which small increments of change in various attributes of communicative effectiveness may be measured. The experimental design of the study provided for the effectiveness of communication centered speech therapy to be compared with the effectiveness of conventional speech therapy and for the speech improvement resulting from both approaches to be compared with the speech improvement made by a control group of mentally retarded children who received no speech therapy. The study further provided that results of therapy be evaluated with test instruments designed to measure a broad range of communicative attributes, including articulatory proficiency. Since, for various reasons, existing speech tests were not appropriate for the present study, it was necessary that new tests of communicative effectiveness be developed. The study was conducted for a period of three years during which the test battery—San Francisco Inventory of Communicative Effectiveness (SFICE)—was developed, therapy administered to experimental groups of mentally retarded children in the public schools, and speech improvement of experimental groups compared with that shown by control groups of mentally retarded public school children who received no therapy. Results of the present study corroborate the clinical impression that communication centered speech therapy improves articulation more effectively than a conventional therapy approach and that both types of therapy improve the oral grammatical complexity of mentally retarded children in a four month therapy period. These results tend to support the practice followed by speech therapists of emphasizing improvement in communicative relationships, group interaction, and the practice of speech sounds in the communicative context. With respect to teaching methods, results support the philosophy that classroom instruction in speech and language which integrates the teaching of communicative skills with the daily life activities of the children may be profitably employed with the mentally retarded. (A report of a 3-year Federal Government Research project.)

A Function of the Speech Pathologist as a Member of a Mental Retardation Unit. J. F. BORRIELLO, *St. Christopher's Hospital For Children, Philadelphia*—The Mental Retardation Unit at St. Christopher's Hospital for Children is one of thirty or more similar projects in the United States that are sponsored by the Children's Bureau. Its purpose is for treatment, reasearch and teaching. Its staff consists of a pediatrician, public health nurse, psychiatric social worker, speech pathologist, psychiatrist, psychologist, chaplain, and educator. Referral is made through the pediatrician. Specifically, a function of the speech pathologist is to do a complete speech and language evaluation which includes: the interviewing of the parents, the observation of the child's play, the observation of the parent-child relationship, and the utilization of a battery of appropriate tests. This type of evaluation has evolved because of the initial observation of the apparent lack of knowledge by the other staff members regarding the communication process. Furthermore, it has been found that adequate impressions, recommendations, and prognoses are dependent upon it. Likewise, the other staff members have come to utilize the results within their specific disciplines in their contacts with the child and parent. Up to the present time, some of the recommendations that have been attempted and clinically studied are as follows: individual and group therapy for the child with parental counseling for the mothers and fathers in a group situation, and a home stimulation program centered about the family's capitalizing upon the spontaneous attempts made by the child to communicate with his evironment.

A Home Training Program in Speech and Language Development for the Retarded Child. MARIE O. SHERE, *University of Illinois*—The purpose of this paper is to discuss the philosphy of speech and language training for the retarded child and to present in detail certain activities which can be carried on in the home. The "normal" child acquires speech and language without any special help. Parents and siblings surround him with speech and are eager to provide him with new experiences. Thus he learns the concepts appropriate to his age and acquires the vocabulary necessary for communication concerning them. This situation does not prevail, generally, in the case of the child who is retarded physically or intellectually. These children must have special help in meeting experiences and in developing appropriate speech and language. Some children are able to attend schools which provide such special help; however the limited time of the school day does not permit them to receive the amount of help which is necessary. For other children, however, no school is available.

In either case, speech and language training must be supplemented or completely provided in the home. As has been pointed out, the home is the place where the child normally receives such training. The every day life activities offer the parents and siblings rich opportunities for providing learning experiences for the retarded child. In this paper we propose to point out ways in which this can be accomplished. The material here presented is based on 15 years of work directed toward assisting parents and teachers in how to use life experiences to develop the speech and language of the retarded child.

S18—HELPING CHILDREN WITH FUNCTIONAL ARTICULATION PROBLEMS.

Emotional and Behavior Problems of First Grade School Children with Functional Defects of Articulation. A. L. Solomon, *Chico State College, Chico, California*—To determine if nonorganic speech disturbances are isolated phenomena or operate as a part of the child's total behavior and social adjustment, 49 first grade boys and girls with functional defects of articulation were matched in pairs with a control group of normal speaking children on the basis of age, sex, grade, and I.Q. Mothers of both groups were interviewed and were asked to describe their children's behavior in the areas of Eating, Sleeping, Toilet Training, Fear and Anxieties, Comfort Patterns, Tension, Aggression, Dependence, and Peer Relations. The protocols were rated by two judges and mean differences were obtained and critical ratios determined. Significant differences were found in the areas of Sleeping, Fears and Anxieties, Tensions, Peer Relations, and Overall Adjustment. The experimental children tended to be passive children who internalized their responses and were characterized by submissiveness, timidity, and a need for approval. The results suggest that the children with functional defects of articulation are not outstandingly maladjusted but represent homogeneous trends in behavior and personality which are part of a larger picture of emotional and social adjustment. The findings can be interpreted to indicate that the speech and behavior problems found together, may both represent refusals to acquire socially acceptable functions because of unfavorable stress or environmental pressures. That speech and behavior problems are found together suggests that both areas should receive attention and that the current mental hygiene approach to the child and his mother should continue to receive therapeutic emphasis. (This research was done as a Ph.D. dissertation at Stanford University under Dr. Virgil Anderson of the Division of Speech Pathology & Audiology, Stanford U. Medical School.)

A Comparative Evaluation of Speech Correction Techniques in the Primary Grades and the Role of Maturation on Misarticulation. F. P. Ventura, G. Ingebo and P. Wolmut, *Portland, Oregon, Public Schools*—The purpose of this study was to determine the relative effectiveness of speech correction (whether in the classroom or outside the classroom) in the public schools, and the role of maturation in the elimination of defective articulation. A school population of approximately 950 children in the primary grades (first through third) was divided into three groups. Group One was given speech correction in the classroom, Group Two was given speech correction outside the classroom, and Group Three acted as a control. The articulation ability of the total population of subjects was measured when school began in the Fall and at the close of school in the Spring. The articulation test used was described by Carter and Buck in the *JSHD*, May 1958. The general results indicate that speech correction in the classroom with the whole class participating achieved the greatest change in articulation ability. Speech correction outside the classroom achieved the greatest change in articulation of certain consonant sounds. Both experimental methods achieved significantly greater change than maturation alone.

Academic Achievement of Children with History of Functional Disorder of Articulation. C. Lightfoot, J. M. McCauley and W. H. Plotkin, *College of Medicine, University of Illinois*—The question was raised: Is functional disorder of articulation part of a syndrome which includes impairment of scholastic learning ability? It was thus decided to study the academic progress, as measured by standard achievement tests and teacher evaluations, displayed during the first eight years of school by a group of white children considered by qualified speech correctionists to have had a functional defect of articulation at some time during their grade-school years. Academic records of these children, called the experimental (E) group, were compared with those of a group without history of speech defect but matched with the E group with respect to date of birth, mental age (measured in the 2nd grade), sex, and race. Since all the children attended the public schools of a rather homogeneous suburban community, there was some control over economic and educational level of the parents. Both groups show superiority in most of the conventionally measured areas. The groups display about the same degree of superiority in any single area. One notable exception was found for the 4th grade sub-test on certain linguistic abilities, viz., capitalization, punctuation, and grammar. On this test the controls were surprisingly superior to the E group. At no grade for which data were available were significant differences found between the groups in other linguistic abilities (paragraph comprehension, vocabulary, spelling) or in arithmetic reasoning and computation. Teachers' ratings obtained for grades 1 through 7, of overall achievement somewhat favor the E group, probably—judging from the deportment marks—because the E group was better behaved. In general those E subjects who required speech correction in the 3rd grade or later achieved as well as those whose treatment was successfully concluded by the end of the 2nd grade.

Adapting the Approach in the Correction of Articulatory Defects. Elise Hahn, *University of California, Los Angeles*—In planning speech correction sessions for children, one usually takes into account the type of defect, the sounds distorted, the age, intelligence, and physical condition and language level of the child. Often, however, with severe articulatory defects in the clinic, a child will show hostility, withdrawal or strong resistance to change. The correctionist's goal in working with the child who maintains the speech defect is to demonstrate to the child that clear and fluent speech can be useful and satisfying to him. The session must therefore be adapted to the present attitudes and communicative needs of the child. In speech correction, a distinction should be made between direct training, indirect training and the nondirective approach. This paper describes each of these approaches. The decision to use a particular approach will be based on (1) case histories, parents' and teacher's descriptions of the child's speech attempts, social behaviors and peer group relationships; (2) on the observation of his play, and (3) on a trial of direct teaching and his reaction to it. If a severe emotional problem is indicated, the trained speech correctionist starts nondirective play therapy and begins to work with the mother with the purpose of convincing her of the need for help from a psychologist. With many of the children who show resistance, however, the indirect approach is used. The correctionist initiates parallel and then shared play, using language and behaviors suitable to the child's level of development. In running comment, the therapist expresses feelings freely, plays with sound making, and indicates satisfaction

with verbal communication, trying continually to stimulate role playing. As the child participates, the correctionist repeats the child's own phrases correctly, suggesting but not demanding imitation. When the child gives evidence of tolerating this and beginning imitation, more direct therapy on communicative materials is introduced.

S21—ADVANCED CLINICAL MEASURES IN DIAGNOSTIC AUDIOLOGY.

Measuring Hearing Prior to the Clinical Response: A Survey of EER-Audiometry. A. J. DERBYSHIRE, F. J. NORKUS and P. J. MILLS, *Illinois Institute of Technology, Chicago;* W. WALDROP, *Presbyterian-St. Luke's Hospital, Chicago*—EER-Audiometry, as a method of measuring hearing, prior to the voluntary response, has undergone many changes since its earliest conception (Doerfler, Marcus and Gibbs, Giddoll). Clinically, the interpretation of the auditory response has been refined, by the use of statistically measured confidence levels (Derbyshire and Farley). Outside of the clinic, electronic identification of auditory responses has received increasingly frequent, and increasingly precise scrutiny (Goldstein, Rosenblith, Kryter). Just as the clinical studies of EER-Audiometry have often had to sacrifice precise definition and formulation, so the elegantly formulated electronic research has often left the question of clinical application behind. The authors review the status of EER-Audiometry, as a clinical tool, citing the relative advantages and drawbacks inherent in the several alternative interpretive methods, and trace the implications of the various findings, as they affect: (1) the state of the subject (from arousal to deep sleep), (2) the parameters of the stimulus (intensity, frequency, duration, rise time, etc.), and (3) the response required (awareness, identification, motor response).

The Association of Abnormalities in Auditory Adaptation to Other Auditory Phenomena. JACK A. WILLEFORD, *Bill Wilkerson Hearing and Speech Center*—Controversy exists as to whether excessive adaptation to threshold level stimulation is a manifestation of cochlear or retro-cochlear lesions. One group of investigators believes that cases which exhibit recruitment, and thus are presumed to have end-organ lesions, will also show abnormal adaptation to sustained stimuli. Other authorities believe that abnormal adaptation is characteristic of neural lesions. Certain authors further contend that peculiar and representative patterns of differential sensitivity to intensity change at threshold (by automatic audiometry) appear as concomitant corollaries of both threshold relapse and loudness recruitment. An investigation was conducted to examine the relationships between abnormal adaptation to sustained pure tones at threshold intensity levels, loudness recruitment, and differential sensitivity to intensity change at threshold. Tests which purportedly measure each of these phenomena (threshold tone decay, loudness balance, and fixed-frequency Bekesy Tests) were administered to a variety of clinical subjects. Findings suggest that abnormal adaptation at threshold may arise from more than one anatomical site. It often appears in conjunction with certain cochlear involvements, but it must also be presumed to be the outcome of neural lesions. Evidence also indicates that, while threshold relapse may arise in certain cases who also exhibit recruitment, the two phenomena are independent entities. The results of fixed-frequency Bekesy threshold tracings revealed that such a test cannot be relied upon as a means of identifying the person with either loudness recruitment or relapse behavior when that person's hearing impairment is due to one of the disorders studied. Such a finding implies that a test for differential sensitivity at threshold makes different demands on the sensorineural mechanism of the auditory system than do the loudness balance or threshold tone decay techniques. (This research is based on a Ph.D. dissertation completed under the direction of Dr. Raymond Carhart, Northwestern University, November, 1959.)

Bekesy Audiometry and Tone Decay Results on Medically Diagnosed Cases of Auditory Dysfunction. GARY THOMPSON and RICHARD HOEL, *Houston Speech and Hearing Center*—The clinical audiologist necessarily is concerned with tests that help differentiate various types of auditory dysfunction. He has many such tests at his disposal including direct and indirect measures of recruitment and measures of auditory fatigue and adaptation. The present study reports clinical results on two of these tests—the Bekesy, about which there is considerable controversy, and the Tone Decay, about which little is known at the present time. These tests were administered to patients referred to the Houston Speech and Hearing Center by local otologists. A medical diagnosis was obtained on each subject used in the study—they included Meniere's disease, toxic labyrinthitis, vestibular neuronitis, pontine angle tumor and other tumors affecting the auditory nerve. Techniques of test administration, method of interpretation and clinical results are discussed in relation to the patients' auditory lesions. The data suggest strongly the effectiveness of the Bekesy in determining threshold recruitment. According to the literature the amount of perstimulatory adaptation occurring during the tone decay test may be related to the site of the lesion. Clinical experience with this test led the present investigators to postulate that in addition to the extent of adaptation, the length of the patient's response at each intensity level might be significant. This was investigated with the following results: (1) Among those with cochlear involvements this temporal relationship assumed converse proportions. (2) Among the retrocochlear patients the relationship assumed inverse proportions.

The Relationship of Pitch Discrimination Based on Difference Limen for Frequency to Speech Performance. LOUIS M. DICARLO and FRANCIS L. NASCA, *Syracuse University*—The difficulty in normal speech development which is often observed in hearing handicapped children by clinicians and therapists is frequently attributed to inability to hear and differentiate the phonemic sound variations of human speech. Lacking such perception, the child is hampered in his analysis, synthesis, imitation and production of the complex sound combinations of speech. The aurally handicapped child is not unique in this area. Many children with normal hearing and articulatory defects are seen daily. The existence of altered functional perception of fine variations in pitch becomes a probable postulate. The child's inability to imitate and produce speech would be limited by his ineptitude in appreciating fine changes in pitch and could cause deficient perception of differences among certain phonemes. An attempt has been made on the basis of clinical testing to ascertain whether a significant relationship exists between the ability to discriminate between pitches and normal speech development. On the basis of clinical measurement of DL for frequency in the case of children between the ages of nine and 14 years with normal hearing and normal speech, children with normal hearing and articulation defects, and children with impaired hearing and impaired speech, the following conclusions were reached: (1) The normal subjects were most consistent in their performance at all frequencies, the impaired hearing subject least consistent, the defective articulation subjects between the other two groups. (2) All three groups exhibited a progressive increase in mean DL from low to high frequency. (3) Statistical analysis revealed the figures for performance on frequency DL's in all groups were statistically significant. (4) The performance of the defective articulation subjects on DL for frequency were found to be inferior to the normal group. (5) The defective hearing subjects were found to be markedly inferior to both of the other groups.

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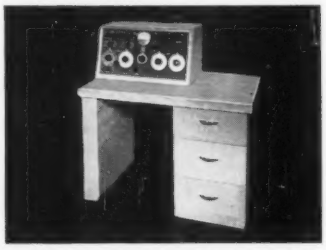

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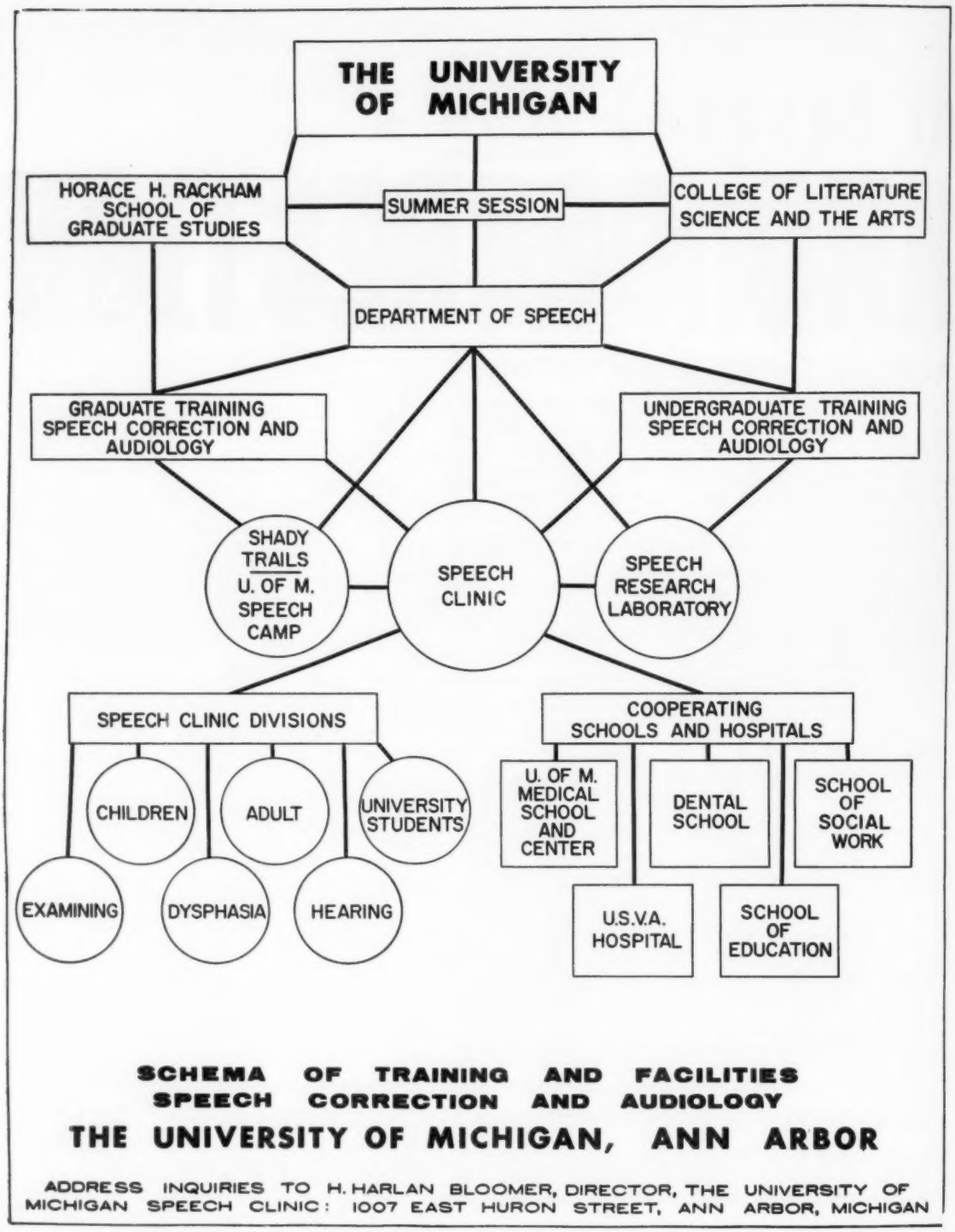

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Sounding Board

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Thousands of IAC Audiometric and Medical Research Rooms Selected for Valid Assessment of Hearing Levels

IAC Rooms have provided "controlled ambient conditions" for industrial and clinical testing as well as for medical research programs of all types.

Valuable in "Threshold of Hearing" Research

IAC Rooms offer similar environments for consistent and valid measurements which can be verified in every installation. These controlled environments have made possible research in the successful establishment of hearing norms of young children.

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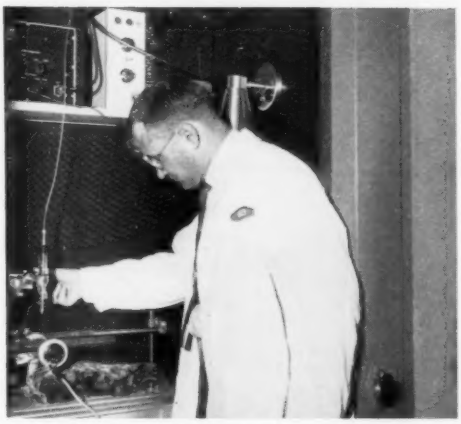
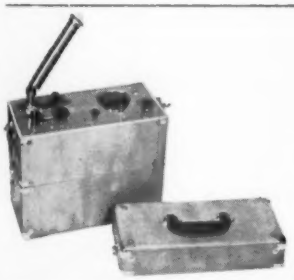
For Auditory Micro-Electric Studies

IAC rooms provide a controlled environment that excludes extraneous noise and prevents stray electrical fields from affecting instrumentation. Circle 61.



Electronic apparatus installed in an IAC Sound Isolation Room measures the effects of drugs on the auditory response of cats.



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The Test Box can be used over a frequency range from 150 c/s to 5000 c/s, and features a built-in 8 Watt loudspeaker, a regulating precision microphone, and an artificial ear. Any sound pressure level from 50 db to 90 db can be used for the measurement.

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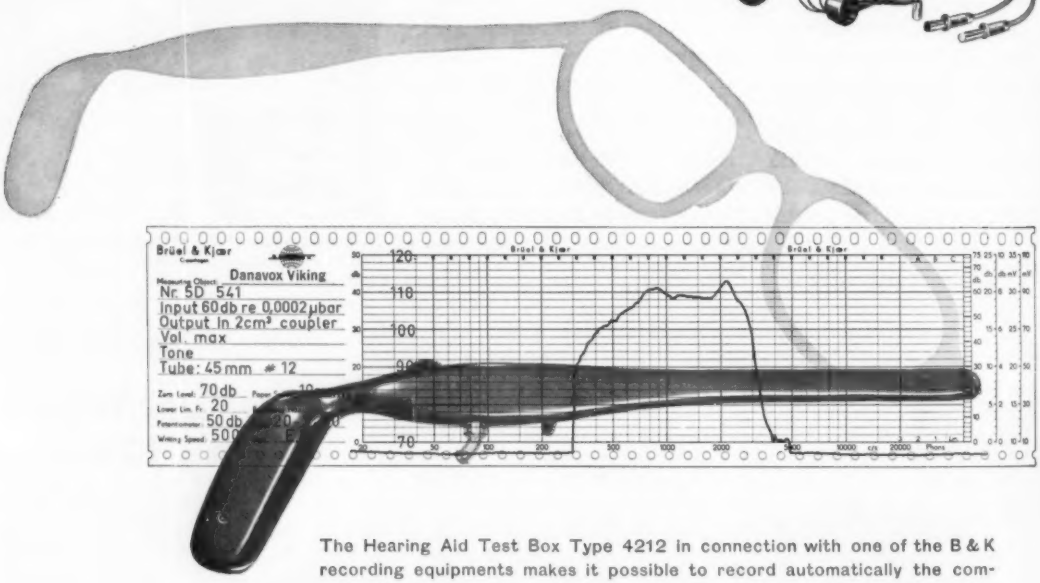
The artificial ear may also be used in connection with a 6 cc standard coupler for audiometer testing.



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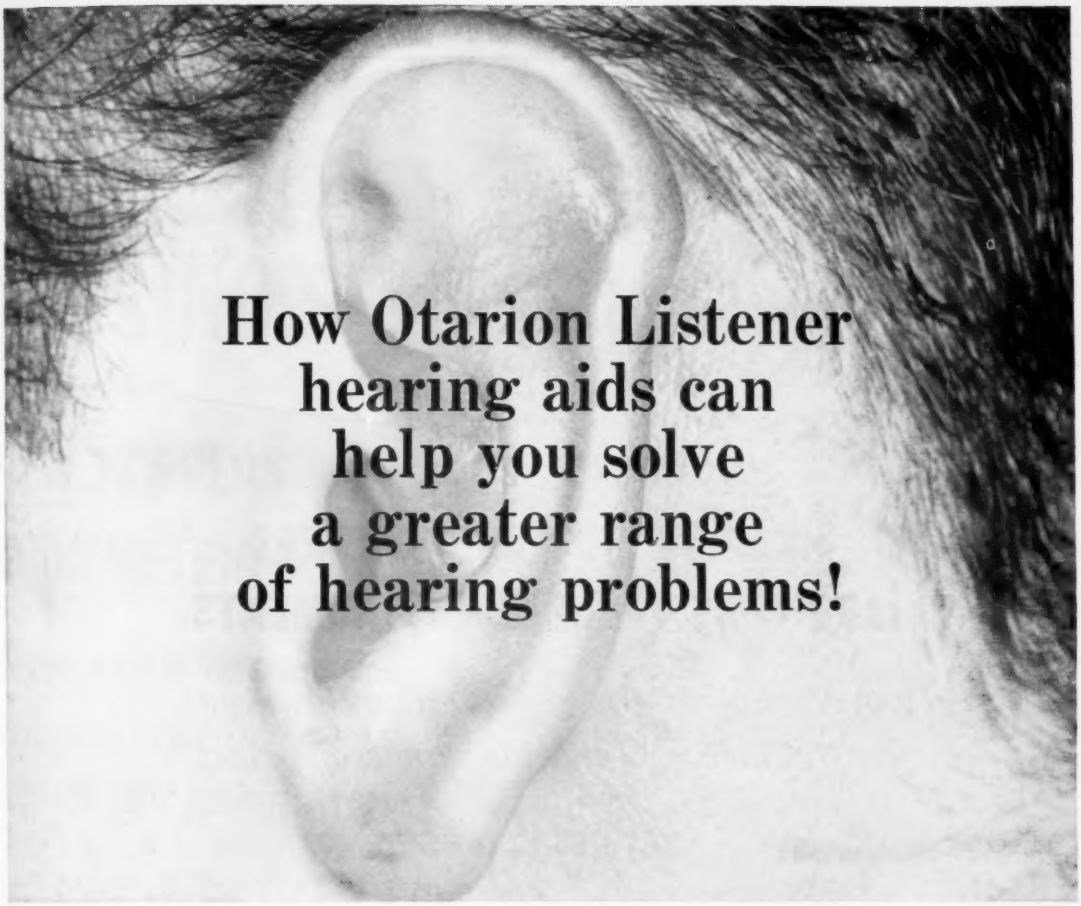

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If you would like to receive any further information on Otarion's wide range of hearing aids, contact **Leland Rosemond, President,** Otarion Listener Corporation, Ossining, New York.

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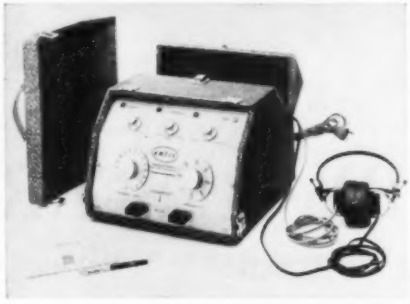

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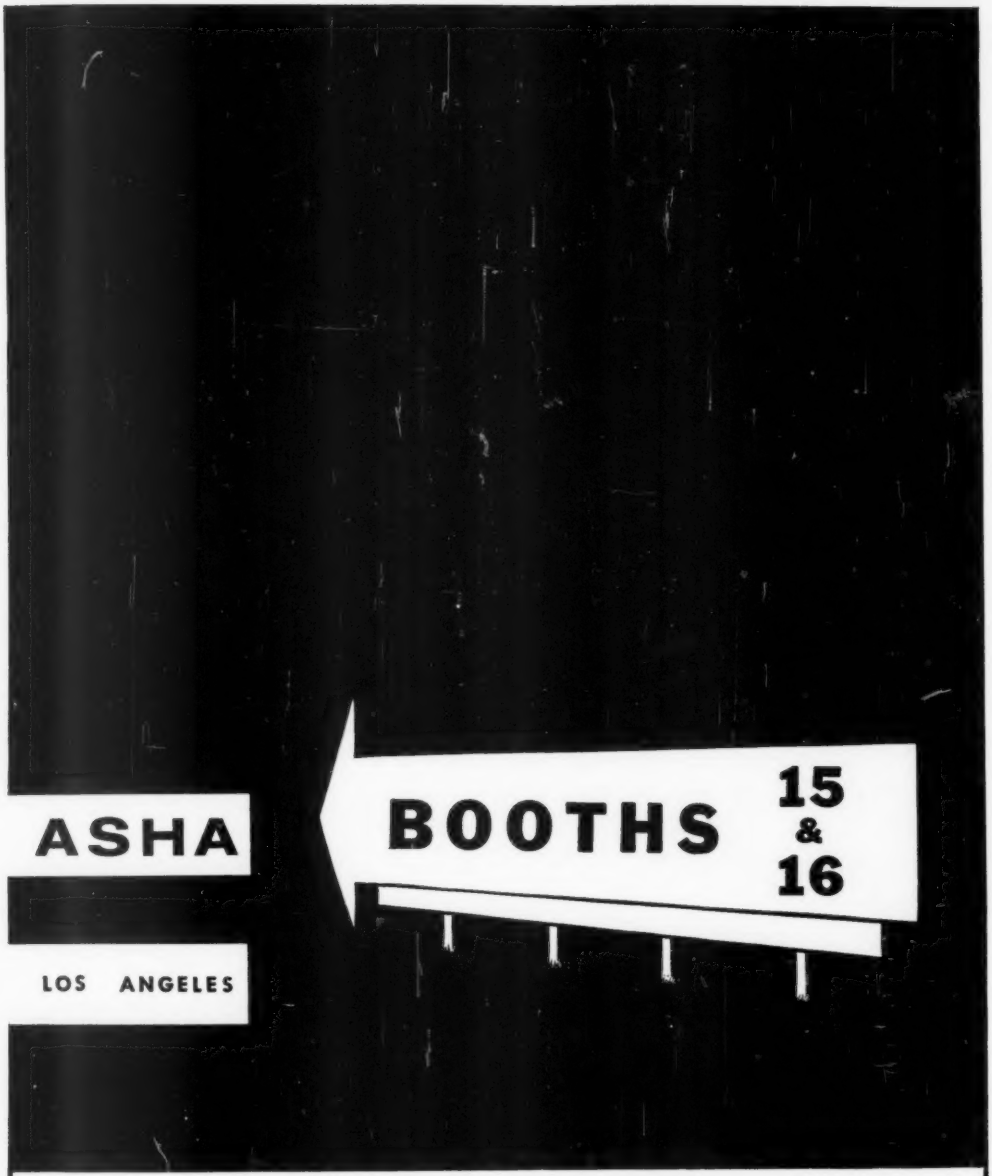

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